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THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR

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TORREYA

January, 1913.

Vol. 13 No. 1

PRIZE ESSAY ON THE LOCAL FLORA

The editorial board of the Club announces the award of prizes offered in March, 1912, for the best popular article written by an amateur, on some feature of the vegetation of our local flora range.

The first prize goes to Mrs. Elmer G. Sammis, of Brooklyn, N. Y., for the essay "A Vacation among the Mosses," printed herewith. The second prize has been awarded to Miss. E. M. Kittredge, of Spring Valley, N. Y., for the essay "Some Trees and Shrubs of Rockland Co.," which will be printed in TORREYA for February. The third prize has been awarded to Mr. John McCallum, of Richmond Hill, L. I., for his article "A Lesson from Common Plants." The board regrets that of the other essays submitted none are of sufficient merit to warrant the awarding of additional prizes.—N. T.

A VACATION AMONG THE MOSSES

By EDITH M. SAMMIS

"Mosses and lichens! What of these? Meek creatures! The first mercy of the earth, veiling with hushed softness its dintless rocks. Creatures full of pity! Covering with strange and tender honor the scarred disgrace of ruin, laying quiet finger on the trembling stones to teach them rest."

It is not often that scientific exactness and literary beauty are so happily combined as Ruskin has combined them in his description of the mosses. Meek creatures they are, with their creeping, or erect, habit of growth. Among the oldest of plants, they are indeed the first mercy of the earth, succeeding the liverworts which were probably the first land plants. How their hushed softness mellows the angles and edges of the most

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jagged rock! Creatures full of pity! What unlovely sights of decaying stumps and logs they tenderly beautify with their

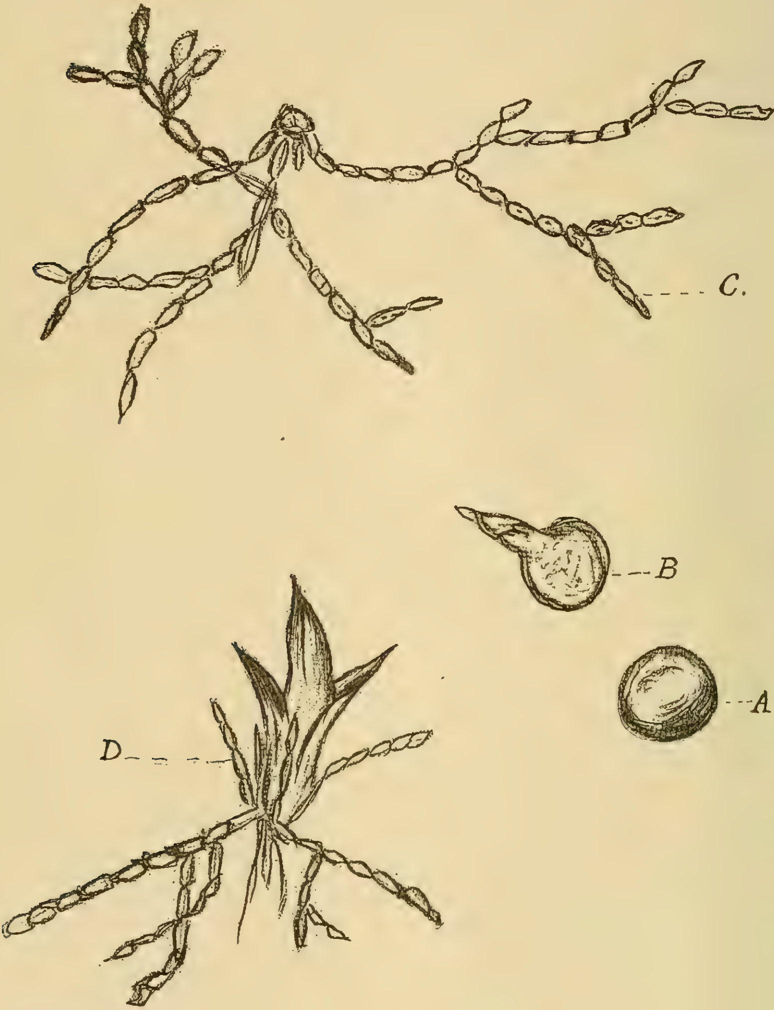

FIG. 1. *A*, spore; *B*, germinating spore; *C*, protonema; *D*, bud. All much magnified.

mysterious traceries! How much disintegration they retard, if not prevent, with the hold of their quiet fingers!

What important part mosses play in the making of the beauty

of a landscape is apparent when one takes a walk among the haunts of mosses during a drought, when rocks and logs and soil are dry and brown and bare because the mosses have folded up their tiny leaves close to the stems to retard evaporation. Take the same walk after a soaking rain, and the leaves are unfolded and spread, and stones, trees and old stumps are radiant in living green. This habit of the mosses of taking up and retaining moisture makes them valuable not only as creatures of beauty but of utility in the economy of nature. "To them, slow-fingered, constant-hearted, has been intrusted the weaving of the dark eternal tapestries of the hills."

And how common they are! In all countries, at all altitudes, in swamps and on dry wastes and hillsides, on soil and submerged in fresh water, they find their quiet way. But they halt at the seashore. Seaweeds are not mosses.

And yet, because they are so small and meek, they have been overlooked by the wayfaring man who thinks of moss as something green and beautiful but too small to suggest the astonishing number of species,—several hundred to be found in the United States alone. "Nature," says some one, "made ferns as leaves to show what she could do in that line." Just a superficial microscopic examination suggests that nature must have made mosses to show what she could do with plants in miniature, for their tiny leaves are as wonderfully shaped, the margins often serrated, and their capsules are as exquisitely molded and carved and painted as are the leaves and fruits of the better known, larger and statelier seed-bearing plants.

While it requires the use of a microscope to make any extensive study of the mosses, many species can be identified by the aid of a simple hand-lens, and the species mentioned in this article can be recognized by one having ordinarily good eyesight. How much it adds to walks through mountain woods to be able to meet as friends even twenty mosses conspicuous for size and beauty, only he who has that delightful acquaintance can appreciate.

Beginners are apt to confuse mosses and lichens and hepatics, calling them all mosses because they are frequently found

growing together and resemble each other more or less. For a knowledge enabling one to distinguish these plants one of the popular books on mosses and their allies will be found helpful and interesting.

Mosses are among the simplest of plants in their development and mode of reproduction. They are spore-bearing plants like the ferns and club mosses, lower in rank then these but higher than the hepatics. The spores have the appearance of green or brownish green powder and they, too, form an interesting study under the microscope. Falling into a favorable environment, the spores germinate, producing what the microscope reveals as a branching thread-like mass, but to the naked eye presents the appearance of the green scum on a stagnant pond. From this protonema (meaning first thread), there are developed little buds which become the gametophyte or sexual plant after the fertilization of the sporophyte or spore-bearing plant. The gametophyte is usually terminated at the apex by a rosette of leaves. The sporophyte consists of the seta or stalk and the capsule containing the spores. The capsule often has a lid or operculum and opens when the spores are matured to permit their escape. Just under the operculum and surrounding the top of the capsule is very often found the peristome, a ring of teeth of different forms in the various species, which by their contraction and expansion and lifting and lowering, according to the temperature and humidity and the maturity of the spores, favor or retard their escape,—an example of nature's extreme care in fostering the propagation of her creatures. The capsule, too, is usually completely covered or topped by a cap or calyptra which frequently falls off at the time of maturity. The common haircap moss has a most conspicuous hairy cap and its peristome, because of its size and beauty, will furnish the beginner a fine specimen for admiration and study. Mosses have no true roots but many possess hair-like processes which resemble roots and are called rhizoids.

Figure 1 shows a spore (*A*) and a germinating spore (*B*), protonema (*C*) and a bud (*D*). All are much magnified. Figure 2 shows a sporophyte (*E*) a capsule with lid closed (*F*) another

with lid removed (H) to allow the escape of the spores, a peristome (J) in dry weather; (K) the same in wet weather or before the maturity of the spores. Figure 3 shows a capsule with calyptra removed. Figure 4 shows a male plant with rosette of leaves at the summit. Figure 5 is an attempt to show the beauty of

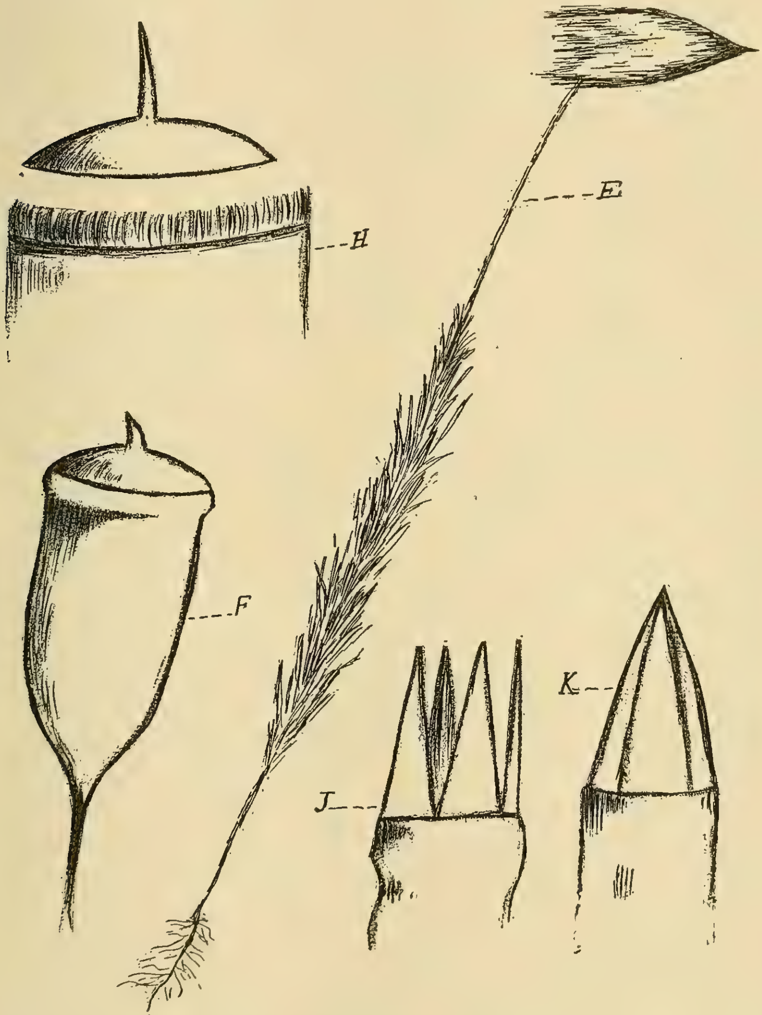

FIG. 2. *E*, sporophyte; *F*, capsule with lid closed; *H*, the same, with lid removed; *J*, peristome in dry weather; *K*, the same in wet weather, or before the maturity of the spores.

the peristome of the common haircap moss. The teeth are sixty-four in number and short, with the tips attached to a membrane which covers the top of the capsule. In wet weather or before maturity, the teeth fit in closely together preventing the escape of the spores; in dry weather they shrink as does also the membrane, by which process the shrunken teeth are drawn downward and inward thus producing apertures through which the spores are shaken by the winds or passing insects or birds. No verbal description can do justice to the delicate ornamentation of the minute teeth.

As mosses are generally so small their study and differentiation into species has been left to the bryologist, the man of science; and therefore few of them, except the larger or more beautiful species have common or local names; and this and the necessity for a lens has not tended to make their study popular.

However, when nature finds it wise to send downpours of rain during one's vacation in the Catskill Mountains, when golf and tennis and motoring are out of the question, a pair of overshoes, a rain coat and an umbrella, a sound body and a hopeful spirit, and just the little knowledge given above will take one forth where the mosses are luxuriating. Just step outside the door and close by the path is a great cluster of feathery green with numberless little wheat grains, apparently, stuck up on hair-like stalks. Pluck two or three stalks and immediately you will recognize the haircap, *Polytrichum commune*. It is erect and one of the largest of the native mosses and common everywhere, in Asia, Europe and North America, and its large hairy cap easily leads to its identity. Like most mosses its appearance changes greatly with the moisture or dryness of the air. The leaves being long, their folding and unfolding effects a marked change in the plants. If you grasp a handful of the feathery stems in moist weather you will not wonder at the information that these mosses have been put to use for stuffing pillows and beds in Lapland, and again, if you pluck some of the dry tough stems during a drought, it will seem quite credible that this same moss is used for making brooms in some countries. Another species is *Polytrichum strictum* which has very long leaves and is sometimes five or six inches in height.

By this time we have become so interested in our newly found acquaintance, whom we have passed by so many years with scarcely a glance, that we are ready to brave the weather and between showers seek a familiar path in the woods. Who would imagine that dead, decaying old logs could be made such objects of beauty? It is nature's pall of her most exquisite

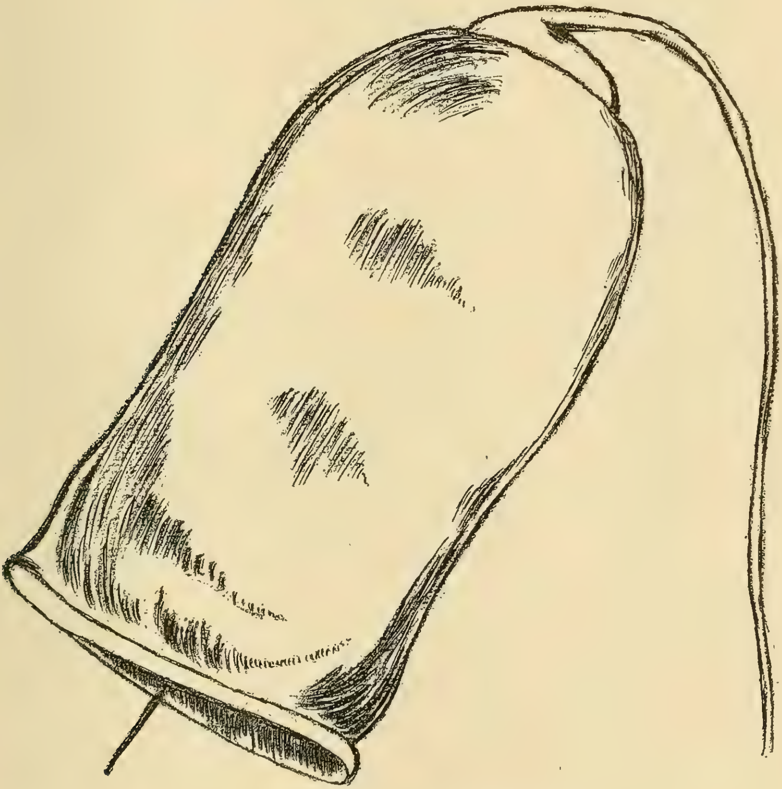

FIG. 3. Capsule, with calyptra removed.

embroidery. Looking closer, we shall find more than one species of the great *Hypnum* family, rather difficult to identify as to species, but we shall have no trouble in determining a few of them. The Hypnums are all prostrate or creeping and form more or less dense mats on soil, rotten wood or stones, and sometimes are found submerged. One of the most common is the

beautiful *Hypnum imponens*, prostrate, of a bright green color, the little plants interlacing and overlapping each other as they cover the fallen logs and decaying stumps and bare stones. The plants resemble tiny plumes. Especially is this true of *Hypnum Crista-castrensis*, somewhat rarer than *imponens* and more faithfully plume-like in appearance. *H. Crista-castrensis* of the Catskills loves especially the old rocks of a hemlock woods where it thrives luxuriantly, often covering with its rich yellow-green plumes a great old needle-strewn rock. *Hypnum uncinatum* or hooked-moss can be readily identified by the curving leaves which form little hooks at the ends of the branches.

The most unseeing eye could scarcely fail to observe the so-called fern-mosses because they are so fernlike in form. They spread their delicate tracery over stones and soil and decaying wood. They are the dainty lace of the woods. There are several species, among the most common being *Thuidium delicatulum*. The mountain fern moss, *Hylocomium proliferum*, is larger and more vigorous, the new plant springing from the upper side of the plant of the previous year. For its best development it requires moist rocks in shady woods where it forms magnificent loosely-woven masses of its feathery gracefully-curving shoots. The fern mosses of the Catskills have not within a dozen years, at least, been very prolific in fruit.

Now as the rain ceases let us walk through the woods where it is higher and drier, and we shall come upon our staunch little friend, the shaggy moss, *Hylocomium triquetrum*. Easy, good-natured little philosopher, it grows in most any environment, but thrives best on soil in moist woods. Its stem is erect and rigid and, as you grasp it, you will note its elasticity which has brought it to the humble but necessary service of a filler in packing fine china.

A moss enthusiast next suggests that we take a walk through Mary's Glen and follow the gentle, softly-murmuring brook along its way through the great old rock-strewn forest. There must be beautiful mosses here we imagine, although we have not noticed them in previous walks. Mosses! Yes, fairy forests

of them growing along the bank of the brook,—tiny trees under which the fairies surely sport and revel. This is the handsome tree-moss, *Climacium americanum.* It cannot be mistaken because of its wonderful tree-like form. It rarely fruits but the little tree-like shoots spring from underground stems.

As we follow the mountain brook looking for *Climacium*, we find anchored to the stones and with their branches, sometimes a foot long, submerged and spread along in the flowing water, one, or perhaps two, species of watermoss, *Fontinalis gigantea* with its strong, three-angled stems and large leaves, and *Fontinalis dalecarlica* with its tough hair-like branches and its capsules found on the older branches which have shed the leaves. The writer has never found *gigantea* in fruit.

Among the mosses which prefer dripping rocks for their best development is *Plagiothecium denticulatum*, of a brilliant green, with the leaves arranged evenly on opposite sides of the stem and forming flat compact mats of green, shining through the dripping water. A great old gray rock three thousand feet above the sea on North Mountain is a sight never to be forgotten with its ancient sides covered with a drapery of *Plagiothecium*, its bright green softened most artistically with the soft gray of spreading lichens.

Moss hunters form the habit of looking closely toward the ground, but many mosses seek out the living tree for their habitat. Such is *Neckera pennata*, found quite high on trees, sometimes as high as

FIG. 4. Male plant, with rosette of leaves at the summit.

fifty feet. The branches are flattened and curve outward and downward, and the capsules nestle on the under side hidden by the peculiarly waved leaves of a grayish green.

The name, Mossy Glen, gives wonderful scope for the imagination, in the language of Anne of Green Gables, but a trip

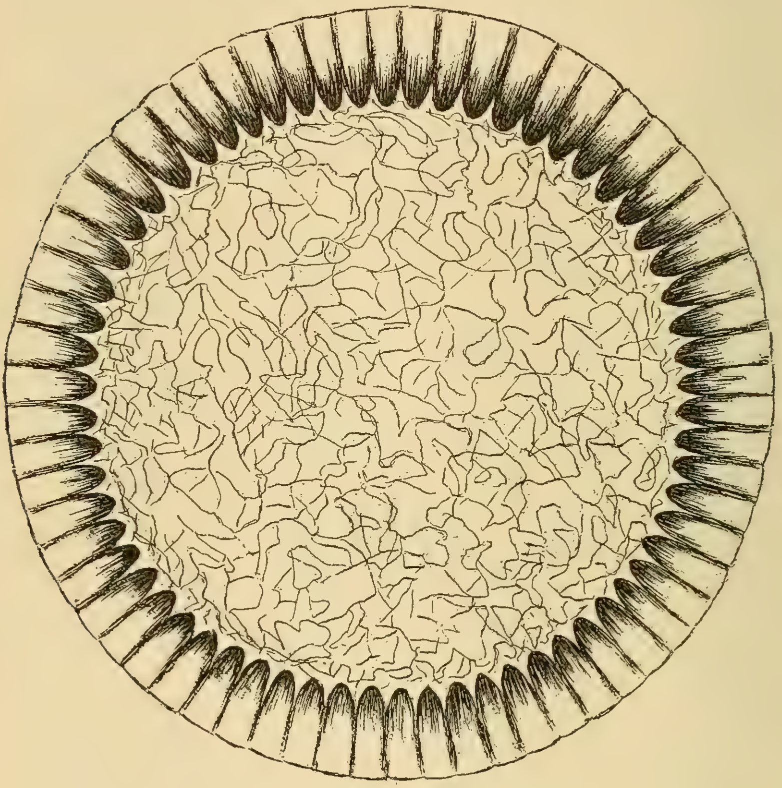

FIG. 5. Peristome of Haircap moss.

there surpasses our wildest dreams in the delights it offers to the moss student. The mountain stream comes tumbling down from the heights, dashing over the rocks, spreading out into mirror-like pools to rest and falling over precipices in numberless cascades, scattering its spray over rocks and leaves and branches that impede its progress. Here beside, and in the midst of, this turbulent fitful stream, dwell, in the moist shady depths of

the forest, members of the *Mnium* family. They are particularly noticeable for the leaf development. The leaves are often quite large and more nearly resemble the leaves of seed-bearing plants. A plant of the species *Mnium affine ciliare* is a faithful copy, in miniature, of a compound leaf of a seed-bearing plant, with numerous leaflets.

Out in Wildcat Ravine, just where the brook spreads itself out quietly upon the top of the cliff before it takes its downward plunge over the mountain side, we shall find the large-leaved *Mnium punctatum elatum.* Its leaves are especially large and have a distinct mid-vein. It prefers the ooze on partly submerged rocks. The male heads of the *Mnium* and those bearing the capsules are very frequently found mixed. Beginners may mistake the two for separate species.

Our book has told us about the *Bryum* family, much resembling the Mniums, and of the difficulty of identifying them without a microscope. But there is a giant *Bryum* which seems easy to recognize if we can find it. Its favorite haunt is secluded from human eye in rich moist loam on shady, sheltered, almost inaccessible cliffs. We take a scramble down over the rocky sides of Round Top and behold! here it is. The rosettes of leaves at the top of the naked stems, looking like perfect little green roses, are arranged, as only nature can arrange her creations, in surpassingly beautiful masses. The *Bryum roseum* fruits infrequently but sends forth new shoots from underground stems called stolons.

In your mountain walks, if you come upon a rock of conglomerate, a fragment of an old seabeach now resting quietly in the shade, look closer and you will be apt to find in the niches of its pebbly surface, bunches or tufts of what appears like green wool. This is the woolly moss or *Bartramia pomiformis.* It gets its last name from the fact that its capsules are quite apple-like in form.

Nature makes haste to hide the bare blackness of burned-over ground. How soon we notice *Epilobium*, the fire-weed, with its racemes of conspicuous purple flowers standing like sentinels where a fire has raged. But if we get closer to the blackened

soil we shall find also, if it be fairly moist, a common liverwort, *Marchantia*, growing sociably with the cord-moss, *Funaria hygrometrica* with its reddish brown twisted seta. This twisting of the seta is more or less common among many mosses but is most pronounced in *Funaria*. In wet weather *Funaria* coils up its seta like a spring and as the air becomes dry it untwists with a snap, hurling the spores from the capsules to be scattered far and wide.*

Mossy Path on South Mountain is a more or less swampy pine woods with the ground covered with several years' layers of pine needles. This is a favorite haunt of the white or cushion moss, *Leucobryum glaucum*. Its name fits it admirably, as it grows packed together in cushion-like mats, with the older and taller plants in the middle and the younger ones added gradually to the circumference. In color it is pale green when the environment is favorable as to moisture. It is almost white when it finds itself in quite dry places. It fruits infrequently except in very wet surroundings.

Of the 248 species of peat moss growing in abundant supplies nearly throughout the world, the beginner will be proud to identify three, found in swampy spots in the Catskills. It is the moss that forms the peat bogs of Ireland and grows in great quantities in the United States. The great power and capacity of peat moss for absorbing moisture makes it valuable in preventing floods. The plants keep growing from the top and die below, and are saved from utter decay and disintegration by some peculiar preservative quality in the ooze in which they grow. In color the peat mosses are grayish green, occasionally bright green or reddish-brown, and *Sphagnum acutifolium* is sometimes pinkish at the top. The spores are freed from the capsule by a miniature explosion which is explained in different ways but which is sure to occur only when the spores are matured and the weather conditions favorably dry. The three species best known and most easily identified are named for the leaf peculiarities. *Sphagnum acutifolium*

* This is true also in *Tetraphis* (see Fig. 2, *J* and *K*). In Dicranaceae, Fissidentaceae, and *Ceratodon* the reverse is true, as the spores are released only in a moist atmosphere. See Goebel, K., Organography of Plants 2: 163. 1905.—Ed.

shows acute leaves, *S. squarrosum* has acute leaves with spreading tips which stand out at an angle from the stem and *S. cymbifolium* has a boat-shaped leaf with a stouter stem. The floor of the woods near the summit of North Mountain is carpeted with a magnificent rug of the pink-topped *Sphagnum acutifolium*, a wonder of beauty to the eye and a solace and comfort to the tired feet of those who have come up with much toil, happily expectant of a view just beyond.

Most mosses lose much of their beauty by the drying necessary for their preservation in herbaria, but most of the twenty or more species mentioned in this article, if carefully pressed, make very beautiful mounts, and if kept from the light will retain their colors almost indefinitely. They can be artistically arranged also in passe-partout style and make unique and much-prized gifts in this form. A dozen specimens arranged on white paper, four by six inches, with a cover of birch bark, with their names and habitat and Ruskin's quotation which opens this article, make a novel and refreshing remembrance for an invalid or shut-in.

If an amateur may venture a suggestion to anyone looking for rest and relaxation from the cares and perplexities of life, and a change from the ordinary recreations of vacation seasons, it would be, "Begin to play with the mosses." You will be rested and refreshed and your powers of observation will be vastly quickened and increased, and a field of such wonder and beauty will be opened to your entranced vision that you will find a new and deeper meaning in Mrs. Browning's lines,

> "Earth's crammed with heaven,
> And every common bush afire with God,
> But only he who sees takes off his shoes."

BROOKLYN, N. Y.

WESTERN ALLIES OF CAREX PENNSYLVANICA

By Kenneth K. Mackenzie

While typical *Carex pennsylvanica* Lam. is found in the wooded regions west of the Mississippi River as far as North Dakota, it is essentially an eastern species. The plant of the western prairies, plains and foothills heretofore referred to that species is well marked, and distinguished from the eastern plant by a number of characters. In addition, two plants of the Pacific coast, geographically widely separated, have heretofore been distinguished, but as they have rarely been collected, the points of difference between them and the more eastern species have never been fully gone into.

One taking up the group soon notices that all three of the western plants differ constantly from the eastern species in the larger perigynia. Those of the western species average fully 2 mm. in width, while those of the eastern species are about 1.5 mm. The western species, too, have the sides so convex that the body of the perigynia appears globose. In the eastern species the sides are so much less convex that the body of the perigynia appears globose-triangular.

The heretofore unnamed species, described below and one of the far western species (*Carex verecunda* Holm) also differ from *Carex pennsylvanica* Lam. and the other far western species (*Carex vespertina* (Bailey) Howell) in having the beak of the perigynia strongly whitish tipped and deeply bidentate. The two last-named species have the beak of the perigynia but little whitish tipped and only shallowly bidentate. The newly described species also has short stiff culms as compared with the taller, and more slender culms of *Carex pennsylvanica.* Other points of difference between the four species are shown in the following key and description:

Mature perigynia 2 mm. wide or more, the body round in cross section
  Beak of perigynium deeply bidentate, strongly whitish tipped
    Pistillate spikes subglobose, sessile.................... *C. heliophila.*
    Lower pistillate spike oblong, peduncled.............. *C. verecunda.*

Beak of perigynium shallowly bidentate, the teeth little whitish. . . . . *C. vespertina.*
Mature perigynia 1.5 mm. wide, the body round-triangular in cross-section. . . . . *C. pennsylvanica.*

Carex heliophila n. sp.

In small to medium-sized clumps, from slender, more or less elongated rootstocks, stoloniferous but the stolons less conspiccuous than in *C. pennsylvanica* Lam.; culms 12–25 cm. high, phyllopodic, reddish-brown and often strongly fibrillose at base, exceeding all or most of the leaves, slender but stiff, wiry and erect, rough on the angles above. Leaves with well-developed blades 5–10 to a fertile culm, the blades flat with slightly revolute margins, 1–2 mm. wide, 4–20 cm. long, much roughened, the lower sheaths frequently breaking and becoming filamentose; terminal spike staminate or occasionally with a few perigynia towards apex, 8–20 mm. long, 3–6 mm. wide, more or less peduncled, many flowered, the scales ovate, obtusish to acute or short cuspidate, reddish-brown with lighter mid-veins and conspicuous white hyaline margins; pistillate spikes one or two or rarely three, from contiguous to more or less strongly separate, globular, and sessile or nearly so, 4–6 mm. long, closely 5–15-flowered in several ranks, the perigynia ascending; bracts not sheathing, scale-like, or occasionally green and prolonged, but shorter than inflorescence; scales ovate, acute, or short cuspidate, varying from obtusish to strongly cuspidate, reddish-brown with 1–3-nerved lighter center and white hyaline sides (but scarcely apex), from slightly longer to slightly shorter than, but not enveloping or concealing perigynia; perigynia puberulent, dull green, 3.5 mm. long, the body short oval, 2.25 mm. long, 2 mm. wide, 2-ribbed, otherwise nerveless, globose in cross section, strongly stipitate (0.5 mm. long.), abruptly contracted into the serrulate strongly bidentate beak, 0.75 mm. long, the teeth slender, readily breaking, strongly whitish; achenes triangular with strongly convex sides, closely enveloped by perigynia, 2 mm. long, 1.75 mm. wide, truncate, round-tapering at base; style slender, scarcely enlarged at base, readily detached; stigmas three.

Of the numerous specimens of this species examined, I designate a specimen collected on the open prairie, near Lee's Summit, Jackson County, Missouri, on May 9, 1897, now in my own herbarium, as the type.

SPECIMENS EXAMINED

ILLINOIS: Oquawka, *Patterson*, June, 1874 (C).*

IOWA: Ames, *Ball* 7, May 10, 1898 (N. Y.).*

MISSOURI: Greenwood, *Bush* 6688 and 6688*A*, May 10, 1912.

KANSAS: Riley County, *Norton* 552, Apl. 4, 1895 (N. Y.) and 552*A*, May 18, 1895 (N. Y.).

NEBRASKA: Ashland, *Williams*, May 19, 1890 (M);* Ft. Niobrara, *Wilcox*, May, 1888 (C); Creete, *Swezey* 147, Apl. 28, 1890 (C); Alliance, *Wambauch* (C); Hay Springs, *MacDougal* 63, June 6, 1901 (N. Y.); *Hayden* (N. Y.).

SOUTH DAKOTA: Brookings, *Williams*, May 22, 1893 (M); Custer, *Rydberg* 1080, June 3, 1892 (N. Y. and C), and 1079, Aug. 1, 1892 (N. Y.); Brookings, *Carter*, May 6, 1897 (N. Y.).

NORTH DAKOTA: Minot, Ward County, *Lunell*, June 5, 1909 (M); Oaks, *Williams*, June 1, 1896 (M); Fargo, *Bolley*, May 27, 1891 (N. Y.).

CANADA: Qu'Appelle Valley, *Macoun* 50, June 21, 1879 (N. Y.).

WYOMING: Big Creek, Carbon Co., *Nelson*, 3966, Aug. 11, 1897 (C); Laramie Hills, *Nelson* 69, May 25, 1894 (C).

COLORADO: Horsetooth Gulch, *Crandall* 2573, May 15, 1897 (N. Y.); Veta Pass, *Rydberg & Vreeland* 6455, June 20, 1900 (N. Y.); Crystal Park, *Clements* 166, June 26, 1901 (N. Y.); Lorimer County, *Crandall*, Apl. 25, 1891 (N. Y.); Ojo, *Rydberg & Vreeland* 6464, May 26, 1900 (N. Y.); Headwaters of Pass Creek, *Rydberg & Vreeland* 6471, June 30, 1900 (N. Y.); Ft. Collins, *Cowen* 2575, May 9, 1896 (N. Y.); Dixon Canon, *Crandall* 2574, Apl. 16, 1898 (N. Y.); New Windsor, *Osterhout* 2283, June 2, 1900 (N. Y.), Colorado Springs, *Jones* 34, May 9, 1879 (N. Y.).

NEW MEXICO: Raton, *Standley* 6349, June 21–2, 1911 (N);* Tierra Amarilla, *Eggleston* 6577, Apl., 1911 (N); Chama, *Eggleston* 6663, May 26, 1911 (N); Chama, *Standley* 6749, July 9, 1911 (N); "New Mexico," Thurber (N. Y.).

* C = Herbarium of Columbia University; N. Y. = Herbarium of New York Botanical Garden; M = Herbarium of K. K. Mackenzie; N. = U. S. National Herbarium.

REVIEWS

Two Popular Hand Books *

These two popular works, both having the same object in view, both addressed to the large class of people who, without special training, wish to acquaint themselves with their local plants, have attacked the problem from very different aspects.

The book written by the Minnesota botanists is "the third of a series intended to render more familiar and usable the plants of the important or interesting groups found in the state." "The text deals with 100 genera, represented by 274 species and about 25 varieties." Each order, family, tribe, genus, and species is outlined in excellently drawn descriptions, which contain a minimum of technical terms and, generally speaking, a maximum amount of clearness. Some purely technical characters are perforce used in a work so comprehensive, and it is a question how amateur users of the book are to interpret these; still more is it almost impossible to avoid their use. To partly overcome this difficulty the authors have prepared, in the introduction of twenty pages, an instructive guide to the rest of the book, explaining in detail, and by the aid of several illustrations, the chief characters by which plants are distinguished and how to "work" the keys.

All the more important shrubs and trees, both native and cultivated, are included and the authors have also seen fit to let in *Epigaea*, *Gaultheria*, *Chimaphila* and *Chiogenes* as examples of "woody plants of the state." There are excellent keys to the genera and species, including some cultivated plants, explained in nearly every case by a very complete set of figures, illustrating the diagnostic characters used in the keys. "The sequence of families followed in the text is that of the 'Besseyan System,' the monocotyledons being placed after the other phyla." This is one of the first modern works to adopt the system in a popular hand-

* Clements, F. E., Rosendahl, C. O., and Butters, F. K., Minnesota Trees and Shrubs, pp. i–xxi+11–314. [Illust.] University of Minnesota, Minneapolis, 1912. Price, $1.00.

Darling, C. A., Handbook of the Wild and Cultivated Flowering Plants, pp. 1–264. Published by C. A. Darling, Columbia University, N. Y. City, 1912. Price, $1.25 postpaid.

book. As to nomenclature, it has "been largely determined by each writer for his own portion, though it is hoped that the results are fairly consistent." Some have followed the new Gray Manual, others, Dr. Britton's Manual, and his tree book, and still other parts of the book seem to conform to neither of these systems. It would have added uniformity to the undertaking for the head of the enterprise to have codified this perplexing matter by adopting one or the other of the chief systems now in use in this country.

However, the book is an excellent attempt to bring before the botanical public of Minnesota in concise and understandable form the chief features of the woody flora of the state. Nothing is omitted that would aid one in using the book and the aim of making it self-explanatory has been thoroughly successful.

Dr. Darling, on the other hand, plunges at once into his problem without table of contents and only two pages of "Suggestions to the Student." His "Handbook of the Wild and Cultivated Flowering Plants" comprises "Key to the Wild Plants and Cultivated Trees and Shrubs which Flower during March, April and May" (pp. 3–26), "Key to the Wild Plants and Cultivated Trees and Shrubs which Flower from June to November" (pp. 27–64), "Key to the Wild and Cultivated Trees and Shrubs in Autumn" (pp. 65–80), "Key to the Cultivated Herbs and Potted Shrubs" (pp. 81–106). Throughout these earlier keys there are page referrences to the general key to the species, systematically arranged, which takes up most of the latter half of the volume (pp. 107–240). Some of these keys have already appeared in TORREYA.*

The difficulty of making keys that distinguish, that are an actual help to the beginner, to whom the book is obviously addressed, seems to have been met in a fairly satisfactory way. There may be much question, in spite of their clearness, whether the average amateur can master a key taking up 25 or more pages, for this is a task that many trained systematists find most difficult. There is, too, the ever-present danger that in using more or less obvious characters, the key may throw one's de-

* TORREYA 12: 46–65, 12: 155–165. 1912.

terminations completely out of gear, so to speak. The lack of any sort of descriptive matter makes it difficult for the amateur to know whether he has "come out right" or not.

For use in a college class or among those who have had considerable training, the work will be a useful field book and it was written partly with this aim in view. There is no book of exactly this character, no one work that attempts to cover the different seasonal aspects of our local wild and cultivated flora. The author states that a subsequent work may be forthcoming which will give descriptions of the plants keyed out in the present volume. Such a companion volume would be a very welcome addition to the present one and together they would be more usable than the keys can possibly be by themselves. A system of cross referencing from the present to the projected book would immensely increase the usefulness of both.

There is a very complete glossary of terms used in the keys which will be found most useful by students. Unlike most glossaries, the definitions are usually self-explanatory even to the uninitiated. With the aid of this and the instructions at the beginning of the book, a patient and careful student can find all of our common plants arranged according to the season at which they flower. In view of the restricted character of this excellent little book its name would have carried greater significance had it been "Keys to the Wild and Cultivated Flowering Plants."

N. T.

PROCEEDINGS OF THE CLUB

October 30, 1912

The meting of October 30, 1912, was held in the laboratory of the New York Botanical Garden at 3:30 P.M. Vice-President Barnhart presided. Twenty-five persons were present.

After the approval of the minutes of October 8, the following persons were elected to membership: Dr. A. M. Johnson, 1206 S. Butte Street, Spokane, Washington; Dr. E. W. Olive, Brooklyn Botanic Garden, Brooklyn, New York; Dr. J. A. Harris, Cold Spring Harbor, New York; Mr. O. Kunkel, Columbia University, New York City; and Dr. H. O. Severance, Columbia, Missouri.

The announced scientific programme consisted of a "Symposium of the Flora of Bermuda," introduced by Dr. N. L. Britton. Others taking part in the symposium were Dr. M. A. Howe, Miss Margaret Slosson, Dr. B. O. Dodge, Dr. W. A. Murrill, Mrs. N. L. Britton, Mr. Stewardson Brown, and Professor Charles L. Bristol.

Dr. N. L. Britton presented a paper on our present knowledge of the Bermuda flora, which will be published in the *Journal* of the New York Botanical Garden.

The following abstracts of the other papers presented were prepared by the speakers:

Dr. Marshall A. Howe spoke briefly of some of the more striking features of the rich and varied marine flora of Bermuda. He remarked that there were probably as many species of plants inhabiting the sea in that region as were found on the dry land. The marine algae of Bermuda are closely related to those of southern Florida and the West Indies, though several species have been described that appear to be endemic to Bermuda. Specimens were exhibited, illustrating particularly the order Siphonales, such as the genera *Caulerpa*, *Halimeda*, *Udotea*, and *Penicillus*, all of which are well represented in Bermuda.

Miss Slosson stated that the fern flora of Bermuda, as represented in the herbarium of the New York Botanical Garden, consists of 19 species included in 13 genera. One of the genera belongs to the family Osmundaceae and the remaining to the family Polypodiaceae. Two families of fern-allies, Salviniaceae and Psilotaceae, are also represented, each by a single species. The list of species and genera is as follows:

Genera	Species
Osmunda	*O. regalis, O. cinnamomea.*
Acrostichum	*A. excelsum.*
Polypodium	*P. Plumula.*
Pteris	*P. longifolia.*
Pteridium	*P. caudatum.*
Anopteris	*A. hexagona.*
Adiantum	*A. bellum.*
Anchistea	*A. virginica.*
Asplenium	*A. dentatum, A. muticum, A. monteverdense.*
Diplazium	*D. Laffanianum.*
Polystichum	*P. adiantiforme.*

Dryopteris..............*D. patens, D. thelypteris, D. Speluncae, D. bermudiana.*
Nephrolepis.............*N. exaltata.*
Salvinia................A species not yet determined but not endemic. It is matched in the herbarium here by specimens from Central America.
Psilotum................*P. nudum.*

Of the above species, four, *Osmunda regalis*, *Osmunda cinnamomea*, *Anchistea virginica* and *Dryopteris thelypteris* occur also in the northeastern United States. Four others, *Dryopteris bermudiana*, *Dryopteris Speluncae*, *Diplazium Laffanianum*, and *Adiantum bellum*, have been considered endemic. *Adiantum bellum*, however, is now reported by Christensen* from Guiana also. Six additional species, not included in the above list, have been reported from Bermuda, but are not represented by specimens in the garden herbarium. Possibly some of these were introduced and have since disappeared. One of them, *Adiantum capillus-veneris*, is known to have been introduced along with other plants by Governor Lefroy, and that some of these foreign residents still linger would appear from the recent collection there, by Mr. Harold G. Rugg, of a single sterile frond of what is probably an East Indian species of *Phymatodes*.

Dr. W. A. Murrill reported that the fungi thus far collected in the Bermudas have been mostly parasitic forms on living leaves and stems such as rusts and smuts and various leaf-spots, or saprophytic forms on dead wood, such as *Xylaria* and *Hypoxylon*. Very few gill-fungi or polypores are known from the islands. Our collections contain *Fomes Sagraeanus* (Mont.) Murrill, known also from southern Florida, Cuba and Colombia; and an undescribed species of *Grifola* just brought back by Dr. Britton which is endemic so far as known and has the peculiarity of growing in grass tufts while most of the species of the genus grow on the roots of living oak trees.

Dr. B. O. Dodge spoke of the fungi collected by Mrs. Dodge and himself during a week in August in 1911. About 50 species were found. Among these were 8 species of slime moulds, 14 species of coprophilous fungi, a few species of Discomycetes and other fleshy fungi. *Ascophanus sarcobius* and *Xylaria arbuscula* were among the rarer species collected.

* Index, 23, 1905.

Mrs. Britton exhibited a collection of mosses from Bermuda, and stated that they included to date 20 genera and 25 species. There had been previously recorded by the Challenger Expedition 5 genera and 8 species one of which, *Trichostomum bermudianum* Mitt., is reported as being endemic and widely distributed on rocks. This last trip has added a new species of *Thuidium* and Mr. Williams reports, in his revision of *Campylopus* for North American Flora another endemic species. This is a large showy plant, thus far only found sterile.

There are a number of common species, such as *Funaria hygrometrica*, *Weisia viridula*, *Tortula agraria*, *Leucobryum glaucum*, *Sphagnum magellanicum* and *Sphagnum trinitense*.

Of the rarer mosses, most of them also occur in Florida, including *Gyroweisia Barbula*, *Syrrhopodon floridanus*, *Fissidens Garberi*, *Cyclodictyon varians*, *Isopterygium micans*, *Anomodon rostratus* and *Amblystegium varium*.

Perhaps the rarest moss is *Rhacopilum tomentosum*.

Of the hepatics, those listed by Dr. Evans in the Bull. Torrey Club 33: 129–135, 1906, include 20 genera and 22 species, of which only 1 is endemic (*Crossotolejeunea bermudiana*).

Mr. Brown and Professor Bristol contributed further interesting information regarding the flora of these islands.

Meeting adjourned.

B. O. Dodge,
Secretary

NEWS ITEMS

We regret to record the death on December 14, 1912, of Miss Jane R. Torrey, the oldest daughter of the late Dr. John Torrey, at Glenridge, N. J.

Jonathan Duell Hyatt, a former member of the Club, who was proposed for membership in November, 1873, died at his home in the Bronx on December 18, aged 87 years. He was elected a member of the Royal Microscopical Society of London in 1879. For many years he was a member of the American Association for the Advancement of Science and the New York Mineralogical Club. He had been for years President of the Microscopical Club of New York.

Professor John W. Harshberger has been elected president of the Philadelphia Natural History Society, which holds its meetings at the Wagner Free Institute of Science, and at the last annual meeting of the Pennsylvania Forestry Association, held on December 9, he was elected a member of Council from Philadelphia County.

Professor Francis E. Lloyd, of McGill University, has been elected a corresponding member of the Centro de Sciencias, Letras, e Artes, Campinas, S. Paulo, Brazil, especially in recognition of his work on the desert rubber plant, guayule.

Professor Raymond J. Pool, of the University of Nebraska, spent fourteen weeks of last summer in continuing his studies of the vegetation of the sandhills of Nebraska. This region covers about 20,000 square miles to the north and west of the center of the state. The soil is dune sand and the topography is that of a typical dune area. The vegetation is primarily that of the prairie-grass formation, but there are associations of other unique character in addition to some of the commoner ones typical of the prairies farther east. In addition to the ecological work done about 2,000 specimens were collected for the Herbarium of the Nebraska Botanical Survey.

The attention of members of the Club is called to the annual meeting to be held on the evening of Tuesday, the fourteenth of January, at the American Museum of Natural History. At that time the reports of retiring officers will be read and an election of new officers for 1913 will be held. It is expected that the committee appointed to suggest botanists eligible to honorary membership in the Club, will report at this meeting.

Dr. Carl L. Alsberg, chemical biologist of the Bureau of Plant Industry, has been appointed chief of the Bureau of Chemistry in succession to Dr. Harvey W. Wiley.

Five members of the botanical staff at the Ohio Experiment Station resigned on December 4, the resignations taking effect on December 7. Those who resigned were E. G. Arzberger, J. B. Demaree, L. E. Melchus, J. T. Rogers, and H. R. Watts.

Dr. Arthur Hollick, who has been continuing his studies of

Alaskan fossil plants at the United States National Museum for several months, has returned to New York.

Dr. Adeline Ames, Ph.D. (Cornell, '12), has been appointed assistant forest pathologist in the Bureau of Plant Industry at Washington.

Dr. Herbert J. Webber, of Cornell University, has resigned to accept the position of director of the Citrus Experiment Station and dean of the Graduate School of Tropical Agriculture of the University of California.

We learn from *Science* (27 December) that Dr. J. M. Greenman has resigned from the University of Chicago and the Field Museum of Natural History to accept the position of curator of the herbarium at the Missouri Botanical Garden. The appointment became effective on January 1.

The Torrey Botanical Club

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TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

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OFFICERS FOR 1913

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Matter for publication should be addressed to

NORMAN TAYLOR
Brooklyn Botanic Garden
Brooklyn, N. Y.

TORREYA

February, 1913.

Vol. 13 No. 2

SOME TREES AND SHRUBS OF ROCKLAND COUNTY*

By Elsie M. Kittredge

When the branches of the willows begin to show the "pussies" we are certain the winter will soon be over. I have found lovely pussies in January, but they usually appear in the latter part of February. During the weary days of wind and rain that we know, and dread, as March weather, they are growing, but so slowly we notice no change, until suddenly some sunny morning the last of March we find part of the bushes are a mass of fluffy yellow balls, while the rest bear curious green tassels. We owe much to the willows commercially, but our esthetic debt is large also. Of the native species the pussy willow (*Salix discolor*) is the showiest. The staminate bushes are very attractive for several weeks before flowering, and then for a few days they are glorious. And they give of their beauty bounteously long before the rest of the plant world begins to waken.

Closely following the willows the swamp maples (*Acer rubrum*) burst into bloom, giving promise by their red and yellow fringes of the wonderful wealth of color to come later in the year.

At this time, also, come the tiny flowers of the spice bush (*Benzoin Benzoin*) making a greenish haze through the damp woods and over the swamps. These shrubs are seldom seen outside their native haunts, and because of their early blooming, comparatively few people who know their later appearance have any idea of how they look when in flower. They are desirable for ornamental planting, because of their early blooming,

* Essay awarded second prize, written by an amateur, on some feature of the vegetation of our local flora range. See Torreya for March, 1912, and January, 1913.—Ed.

[No. 1, Vol. 13, of Torreya, comprising pp. 1–24, was issued 8 January 1913.]

beautiful, aromatic foliage, and lovely scarlet berries, which gleam among the yellowing leaves in September.

Mayday usually finds the shad-bushes (*Amelanchier Botryapium*) in bloom. In the swamps where they abound they remind one of the snows so recently passed, but more often we see but a solitary bush, lightly tossing its white arms and enjoying its brief reign. If the weather is pleasant the flowers may remain several days, but the first shower discourages them, and the petals disappear. I knew one shad-bush years ago that was a large tree, thirty-five or forty feet high. It was a beautiful sight when in full bloom, for it stood on the edge of a dense wood, and the trees back of it made a wonderful background for its white flowers.

From early in May, when their leaves and flowers are unfolding, until the last leaf has fallen, the sassafras bushes and trees are attractive. The flowers are a rather inconspicuous greenish yellow, but the young leaves are olive green, more or less tinged with rusty red, which disappears when the leaves are full grown. In the fall they assume all shades of yellow and red, making a gorgeous display lasting two or three weeks, if the weather is favorable.

Wild cherries abound. *Prunus serotina* is the first to bloom, but the flowers of *P. virginiana* are the prettier. Trees and bushes are a mass of bloom for ten days or two weeks, and every breeze brings the pleasantly bitter fragrance into the house. And in August what a feast they set forth for the birds! Wild canaries, orioles, robins, chippies, and others—by the hundreds they gather in one small tree, and chatter most amiably between mouthfuls.

By the middle of May the pinxter flower (*Azalea nudiflora*) is in bloom. It once clothed many slopes of the Ramapos, but like its cousins, the trailing arbutus and mountain laurel, its beauty is the cause of its destruction. In color the flowers range from pure white to deep crimson and maroon, but these extremes are very rare. The common shades are rosy purple, purplish pink, and almost pure rose pink. There is a marked difference in the shape of the flowers, some bushes bearing flowers

whose lobes are narrow and much recurved, other flowers having lobes almost as broad as they are long, and opening nearly flat. The flowers most commonly found, however, have lobes about half as wide as long, one being less recurved than the others. Young bushes are very symmetrical but after they begin blooming they soon become ragged and misshapen. A bush in full bloom is almost beyond description. The flowers are rich in perfume, and bees are always busy among them. I saw a bush this spring which I am tempted to believe had never before been seen by human eyes —at least not in bloom—and I would not have seen it if I had not heard the hum of the bees. I was "way in the back of beyond," enjoying earth and sky and trying to be thankful enough for all the beauty around me, when I became conscious of a peculiar sound, which I soon realized was the hum of many bees. "Where bees are flowers are," I thought. "There must be many bees to make such a noise so there must be many flowers." On my left were open meadows, full of beautiful things, but nothing to account for the bees. To the right was a dense thicket, extending to the wooded hills beyond, and as I listened the sound seemed to come from the right and a little ahead of me, so I started in that direction, cutting my way through alders, spice bushes, wild cherries and viburnums, all interlaced with cat-brier. My progress was slow and painful, but presently I caught a glimpse of pale pink, like a fluffy cloud resting on the ground. With growing wonder I plied my knife, and edged my way on, until I suddenly came into a little open space, and then I was more than repaid for my toil. The bush was close to ten feet high, I should think, and fully that in its greatest diameter. "Nudiflora" exactly described it, for there were no leaves, and hardly a bit of the twigs could be seen, the flowers were crowded so closely. They were much smaller and paler than those usually found, but it seemed to me they were more fragrant. One gaunt dead branch was mute evidence of the recent hard winter, and I braved the bees long enough to cut it away, then sat down and enjoyed that bush for half an hour. I longed for my camera, yet knew no camera could do justice to its beauty, so I have only a memory of one of the most beautiful things I ever saw.

There are huckleberries and blueberries in great variety all through the meadows and mountains. The high-bush blueberry (*Vaccinium corymbosum*), which blooms in May, is the most striking both in flower and fruit, but it is seldom a fair specimen is found. That species seems to be dying off in this region. One bush that was vigorous and beautiful in bloom three years ago showed a dead branch by the time the fruit was ripe. Next year half the bush was dead and this spring not a flower was to be seen, just a few pale leaves on the topmost twigs of one side.

The flowering dogwood (*Cornus florida*) blooms the latter part of May, and is as much sought after as is the pinxter flower. It is one of the most shapely trees when it has plenty of room, but in the woods we more often find a trunk with only one or two branches, than a symmetrical tree. The trees in this region are usually white bracted, but occasionally we find one with pink "petals," as some of us persist in calling them, and sometimes yellowish bracts are found, but I have not seen here the clear lemon yellow bracts I saw in the North Carolina mountains. The pink bracts are noticeably larger than the white, while the yellowish ones are smaller, and the flowers of the pink trees are paler than the type, while those of the yellow trees are usually much darker. Last winter was severe in this region, and the trees and shrubs showed its bitter effects in various ways. I took particular notice of some young dogwood trees I found in an out-of-the-way corner last year, for their branches then were covered with flowers and the bracts were unusually large and very white. This spring they bore very few flowers, and the bracts were small, and streaked and blotched with gray and brown. I also found a tree last year with deep rose-pink bracts—I had never before seen so intense a color in the wild state—and this spring it had only half a dozen clusters of flowers, and the bracts were small and dirty-looking. In full bloom the flowering dogwood is undeniably lovely, but in its autumn dress it is magnificent, its leaves choosing rich crimson, maroon and golden yellow, while its berries glow like rubies. The flowering dogwood is the one tree I have found country people willing to

transplant from the woods into their "yards." Usually they prefer to buy their "ornamental" trees and shrubs from the traveling nursery salesman, and no amount of argument or comparison will convince them that they have, in many instances, paid considerable money for exactly the same things they have growing in their own woods or back pasture. "The man said it was from Japan," and that settles it. But perhaps because they can see "the dogwoods gleaming white" through the darkness of the other trees, they find it acceptable, even if it does "just grow wild."

Four viburnums are common in this region, *V. acerifolium*, *V. dentatum*, *V. Lentago*, and *V. prunifolium*. Branches of what I take to be *V. alnifolium* have been brought to me, but as I have never come across a bush I cannot say it is common. *V. Lentago* and *V. prunifolium* are in bloom by the last of May, but the others are a week or ten days later. *V. prunifolium* forms dense thickets in some places, and when the bushes are in bloom they are worth going to see. The leaves are always beautiful, being more glossy and richer colored than the other species, but in the late fall they are particularly beautiful, turning rich dark red and bronze. *V. Lentago* grows along the neglected back roads and the pasture fences. Its clusters of flowers are larger than *V. prunifolium*, but to me not so attractive. In the fall the foliage is much more brilliant but does not stay on the bushes so long. *V. acerifolium*, the "flowering maple," as it is called here, grows plentifully in the woods. In the open woods the flowers are quite white, but where it is very shady they are a dull pink. Late in September the leaves begin to fall, some turning a dull grayish brown, and quickly falling, others assuming a purplish tinge, and others becoming quite pink in blotches, and lasting a long time, making a beautiful contrast to the almost black fruit. The odor of all the viburnum flowers is unpleasant, but of *V. dentatum* exceedingly so. The cymes of this species vary greatly in size, even on the same bush, some being about six inches in diameter, others not more than two. The leaves remain green until late, then shrivel and fall. Some birds are fond of the fruit, and it is seldom one can find a full cluster after the berries begin to turn.

The white locust (*Robinia Pseudacacia*) is common in this county, sometimes growing to a great height, but usually found as small trees or large bushes along lanes and fences. The flowers appear the last of May, or first of June, and for a week the trees are beautiful, as every little branch bears several racemes of delightfully fragrant flowers. There is a superstition among country people that lightning will not strike a house near which grows either a white locust or a mountain ash. In some localities the latter is known as "lightning tree" because of this belief. The clammy locust (*R. viscosa*) and the moss locust (*R. hispida*) are to be found here, but the latter is not as plentiful as the former, which sometimes forms thickets. They begin to bloom about the time the flowers of the white locust appear, but their season is much longer. Neither is fragrant, partly atoning for that lack by the exquisite tinting of the flowers. The petals of the clammy locust are pale pink, but the calyx is tinged with rich red, thus giving the effect, especially from a little distance, of rather deep pink flowers. The flowers of the moss locust are rosy purple, very beautiful indeed, in contrast with the pale green stems beset with dark red hairs, and the deep green leaves.

Mountain laurel (*Kalmia latifolia*) used to cover the hills, and is still abundant in certain localities, but in a few years we may count ourselves fortunate to come across one bush, where now there are hundreds. Laurel is not only extensively gathered when in bloom, but because of its beautiful evergreen leaves, is much sought after for Christmas decorations. And then people are utterly at a loss to understand why there are no flowers the next year, "when we found *quantities* here last June!" There is a large estate not far from here, whose owner has gone to much trouble and expense to make a laurel plantation. For several weeks of the summer, and again in the winter, I am told he keeps fierce dogs in the grounds, and his men are armed with guns, in order to keep away the hordes of people who think because the bushes are native, they are at liberty to help themselves. In the higher hills the laurel bushes grow quite tall, but the usual height is from three to five feet. The flowers vary greatly in size, some being a little over an inch in diameter when fully

expanded, others not much over half an inch. Some are pure glistening white, except for the ruby ring; others are pale pink, and others deep rich pink.

The tulip tree (*Liriodendron Tulipifera*), of which we have many noble specimens, comes into bloom about the middle of June. The beautiful cups of pale yellow and orange, resting lightly on the ends of the small branches, are not easily seen, because of the wealth of leaves fluttering in the slightest breeze, but when branches are placed in convenient jars the effect is wonderful. The flowers, at least when in the house, exude a clear sticky fluid, almost as adhesive as glue.

The panicled dogwood (*Cornus candidissima*) and the kinnikinnik (*C. Amomum*) bloom the latter part of June. The former is to be found in quantities in many fields, and edging the deep woods, and its feathery clusters of flowers are very dainty. In September the leaves assume a reddish tinge, thus displaying the clusters of white berries to the best advantage. The kinnikinnik grows in the swamps, and attracts little attention when in bloom, as the greenish white flowers are in small clusters, but later in the year the beautiful blue berries, nestling among the green leaves, are wonderfully attractive.

Not to speak of the elderberry (*Sambucus canadensis*) would be a crime, since it is so common, the flowers so beautiful, and the fruit so desirable. Almost every fence corner in the "back districts" has a clump of elders, and in some of the swamps there are hundreds of bushes. The large cymes of white flowers are so sprightly, one wonders at the somewhat lackadaisical appearance in the bush when not in flower. The leaves seem to droop, and the branches are greatly bent late in the summer from the weight of the drooping clusters of berries, heavy with the rich crimson juice, beloved of country housewives for wine for the sick room. It has been often remarked that if this wayside bush were an importation from over seas we would rave of the wonderful beauty of its flowers, whereas now little or no attention is paid to it, except when the fruit is ripe.

The swamp azalea (*Azalea viscosa*) is to be found in many of our swamps, blooming the latter part of June and during July.

The size of the flowers varies greatly on neighboring bushes, also the richness of perfume, some bushes bearing flowers nearly two inches long, exceedingly fragrant, while on other bushes the flowers are not much over an inch long and have little fragrance. The flowers are usually pure white, but on one bush that I know a faint pink is to be seen on the buds.

For a few days early in July our hills are drifted over with the feathery white blooms of the New Jersey tea (*Ceanothus americanus*). I am told that in the "back districts" country people still make use of the leaves as a substitute for tea, as the loyal colonists did in Revolutionary times.

Happily, wild roses grow almost everywhere, and put forth their blossoms in profusion. The pasture rose (*Rosa humilis*) and the swamp rose (*R. carolina*) are the most common here, and bloom all through July and well into August. Occasionally new shoots will bloom late in September, and I have found a few in October, after several frosts. These later blooms seem always more fragrant and beautiful than those which appear in the regular season, and are graciously pleased to remain fresh and lovely for a couple of days in the house.

Late in July the swamps and wet woods are made most attractive by the beautiful and fragrant white alder (*Clethra alnifolia*) and button-bush (*Cephalanthus occidentalis*). Unfortunately the first shower spoils the beauty of the button-bush, turning all the tiny flowers brown, but after the flowers are all gone the bush is again interesting, with its dark green leaves veined with red, and the curious balls of seeds. The white alder has a longer blooming season, sometimes lasting into September, and is one of the accommodating bushes, permitting its flowers to remain fresh and sweet for several days in the house.

During September and the first part of October, the bushes and trees that delighted us with beautiful flowers earlier in the year enchant us with the wonderful coloring of their leaves and fruit, so we cannot mourn the flowers. All the dogwoods and viburnums show marvellous combinations and blendings of reds and yellows and blues. And now the sumacs, to which we have paid no attention during the summer, flame from every field and

swamp. The first to turn is the smooth sumac (*Rhus glabra*). The mountain sumac (*R. copallina*) usually keeps its rich dark green color much later than the others, and when it does turn, shows more crimson than scarlet. But the poison sumac (*R. vernix*) is the most gorgeous of all, which is a great pity, for the lure of its wonderful leaves causes much suffering to most of those who touch them. Several years ago one of the country churches was elaborately decorated with it. Although a stranger, I told some of the people the bush was dangerous but was met by smiling assurances that I was mistaken, and they kindly pointed to the mountain sumac as the one to avoid. I never heard the results of that decoration, but suppose if any were affected, they attributed their discomfort to some other cause. Of the large trees the sassafras and the various maples claim most attention because of their vivid colors. Some of the swamp maples turn very early, others remain green until October, so the swamps are ablaze in spots for several weeks. The berries of the black alder (*Ilex verticillata*) make the swamps gay after the leaves have fallen. Gathered late in October, and kept in a cool place, not too dry, these berries will remain fresh and brilliant and add much to the beauty of holiday decoration.

Presently trees and shrubs are stripped of "their wealth of gold and crimson" and they compose themselves to rest. Then on a quiet day late in October, when everything seems dead, we come suddenly upon the witch hazels (*Hamamelis virginiana*) in full bloom! The bare branches are covered with curious lemon-scented yellow flowers,—for all the world like tiny wisps of crinkly yellow tissue paper, scattered over a dead bush. The gathering of the branches is attended with some little discomfort, for we cannot avoid touching the ripe capsules, and the seeds fly in every direction, sharply stinging cheeks already tingling from the frosty air.

SHORTER NOTES

PROLIFICATION OF THE FRUIT IN OKRA, HIBISCUS ESCULENTUS. —Among the various phenomena included by teratologists under

the term "prolification of the fruit" one of the most interesting is the production of a more or less completely formed second fruit inside the first. Generally, the included fruit is distinctly abnormal in character, often reduced to a whorl, or a series of whorls, of irregularly formed and usually sterile carpels. Sometimes, however, the carpels bear rudimentary ovules. The stigmas, which are developed early in the embryology of the fruit, are generally well formed.

A brief review of the literature of this type of phenomenon has been given elsewhere.* The purpose of the present note is merely to call attention to the occurrence of this type of abnormality in another fairly commonly cultivated plant, the garden okra or gumbo, much prized by the southern cook.

In the fall of 1908, one fruit of a large thick-padded variety of okra† was found to contain a fairly well formed fruit.

In 1909, the seed saved from various 1908 plants was put out so late that the individuals did not reach maturity, although they produced a number of practically matured fruits.

These were dissected with the result that there were found

Normal	575
Proliferous	37
Total	612

The included bodies were in all cases slight or considerably smaller than the one noticed in 1908. They were green in color, with sometimes only imperfectly formed carpels. The stigmas were, however, clearly differentiated in many, if not in most of the cases. The walls had the hairy covering characteristic of the outside carpels.

In all cases, the included "fruit" was produced near the tip of the fruit—at least in the upper half. It was in all cases central in position and cannot in any case observed be considered to occur within a locule. Its origin from a primordium which should

* Harris, J. Arthur, Prolification of the Fruit on *Capsicum* and *Passiflora*, Ann. Rept. Mo. Bot. Garden 17: 135–145. 1906.

† The commercial seed with which I began an experiment appeared to be decidedly mixed, and I did not retain the varietal name, proposing to separate the various strains by breeding. My material was lost by unfavorable conditions in the next year.

normally develop into an ovule, as is sometimes the case with the included carpellary masses in the red pepper, *Capsicum*, and the passiflora, *Passiflora gracilis*, seems, therefore, to be precluded.

But, on the other hand, I was unable to satisfy myself of the existence of a stalk directly connecting the included fruit with the torus. The axillary region of the fruit is of a spongy nature and very soft in all these specimens. It seemed to form a more or less continuous column from the base of the green prolification to the torus, but it is difficult to say what is continuation of torus and what is produced by the carpellary margins.

The considerable number of cases observed renders it highly probable that the abnormality will be met in other cultures. If a strain rich enough in the anomaly could be found a thorough morphological investigation would be a profitable task.

J. Arthur Harris

On the Identity of Poa crocata Michx.—The type specimen of this grass is in the herbarium of Drake de Castillo in Paris, where I examined it in December, 1911. It is an excellent sheet of five culms and is labeled "Juxta amnes ad Lacus Mistassini defluentes. No. 160." There is also a second sheet with two plants but only one panicle, which is labeled merely "No. 160. Poa crocata." A third sheet containing two culms is labeled "Hort. Par.," evidently grown in gardens at Paris. In this the spikelets are slightly larger. The labels are all in Michaux's handwriting. All of the specimens represent *Poa triflora* Gilib. (*Poa serotina* Ehrh.) to which *Poa crocata* was assigned as a synonym by Steudel, and in which he has been generally followed.

C. V. Piper

Taxonomy and Other Phases of Botanical Work.*—In connection with the article in the November number of Torreya, by F. J. Seaver, on Ancient and Modern Views Regarding the Relation of Taxonomy to Other Phases of Botanical Work, it may be of sufficient interest to note an opinion expressed on the subject in England about one hundred years previous to

* See Torreya for April and November, 1912.

Dr. M. C. Cooke's paper to which reference is made. It would indicate that comparisons as to the relative merits of various phases of botanical work are not all of recent utterance. Gilbert White, in The Natural History of Selborne, in letter XL to the Honourable Daines Barrington, dated June 2, 1778, made passing comment in these words: "The standing objection to botany has always been, that it is a pursuit that amuses the fancy and exercises the memory, without improving the mind or advancing any real knowledge; and where the science is carried no further than a mere systematic classification, the charge is but too true. But the botanist that is desirous of wiping off this aspersion should be by no means content with a list of names; he should study plants philosophically, should investigate the laws of vegetation, should examine the powers and virtues of efficacious herbs, should promote their cultivation; and graft the gardener, the planter, and the husbandman, on the phytologist. Not that system is by any means to be thrown aside; without system the field of nature would be a pathless wilderness; but system should be subservient to, not the main object of, pursuit."

Wilbur L. King

PROCEEDINGS OF THE CLUB

November 12, 1912

The meeting of November 12, 1912, was held at the American Museum of Natural History at 8:15 P.M. President Burgess presided. Twenty persons were present.

The minutes of the meeting of October 30 were read and approved.

The announced scientific program consisted of an illustrated lecture by Mr. J. J. Levison on "Tree Problems of Our City."

Meeting adjourned.

B. O. Dodge,
Secretary

November 27, 1912

The meeting of November 27, 1912, was held in the laboratory of the New York Botanical Garden at 3:30 P.M. Vice-president Barnhart presided. Ten persons were present.

The minutes of November 12 were read and approved. As there was no business to be transacted the scientific program was taken up. The first number consisted of a paper by Dr. W. A. Murrill on "The Polypores of the Adirondacks." This paper has been published in full in the *Journal* of the New York Botanical Garden, 13: 174–178. N 1912.

The second number was given by Dr. A. B. Stout. The subject of his discussion was "The Distribution of Tissues in the Root Tip of *Carex aquatilis*." Several photomicrographs of sections of root tips were exhibited, and drawings were made to illustrate particular features in the arrangement of the tissues.

Meeting adjourned.

B. O. Dodge,
Secretary

December 10, 1912

The meeting of December 10, 1912, was held at the American Museum of Natural History at 8:15 P.M. President Burgess presided. Twenty-two persons were present.

The minutes of November 27 were read and approved.

On the motion of Dr. Southwick the treasurer was authorized to draw an order for the sum of twenty dollars in favor of Dr. William Mansfield to cover the dues as the representative of the club to the council of the New York Academy of Sciences.

The paper of the evening was on "Diatoms," by Dr. Marshall A. Howe. It was a semi-popular account of the principal structural and morphological features of diatoms, their distribution and habitat, their geological interest and importance, the various economic uses of diatomaceous earths, etc. The talk was illustrated by about seventy-five lantern slides from the collection of the late Charles F. Cox. Many of the photographs shown were made under high powers of magnification and they brought out with much distinctness the secondary markings and other minute structural details of the walls of various types of diatoms.

Meeting adjourned.

B. O. Dodge,
Secretary

NEWS ITEMS

The announcement is out for *Physiological Researches* a new publication which is to appear at irregular intervals and is to be devoted, as its title hints, to researches in physiology. Both plant and animal physiology are to be included, although those who are responsible for the enterprise are all botanists. "Each volume will be completed in no specified time, is to contain not less than 450 pages, the latter numbered serially throughout." Further information about the proposed new publication can be obtained from Dr. D. T. MacDougal, of the Carnegie Institution, Washington; Dr. H. M. Richards, Barnard College, Columbia University, or from Dr. B. E. Livingston, of Johns Hopkins University, who is the manager.

At the recent Cleveland meeting of the Botanical Society of America the following officers were elected for 1913: *President*, D. H. Campbell, Leland Stanford; *Vice-President*, M. A. Howe, New York Botanical Garden; *Treasurer*, Arthur Hollick, New York Botanical Garden; *Councilor*, G. F. Atkinson, Cornell University. Dr. G. T. Moore's election as secretary in 1912, at the Washington meeting, is effective until 1917. At the Cleveland meeting a resolution was carried authorizing a committee of five to establish a journal. The committee consists of F. C. Newcombe, *Chairman;* L. R. Jones, G. T. Moore, D. S. Johnson and R. A. Harper.

Under the auspices of the Carnegie Institution, the New York Botanical Garden and the Smithsonian Institution an expedition left New York on January 25 for the West Indies. Dr. and Mrs. Britton, Miss D. Marble, Dr. Shafer and Dr. J. N. Rose will visit St. Thomas, the Virgin Islands, Guadeloupe and Martinique, returning by way of Porto Rico, where Dr. Shafer will remain. The chief object is to collect living and herbarium specimens of cacti.

The United States Geological Survey has just issued a publication of great interest to plant geographers. It is a work of 900 pages on the geology of North America, by Bailey Willis. It is

issued as Professional Paper No. 71 and the exact title is "Index to the Stratigraphy of North America." The book, together with a geologic map of the continent, is now obtainable gratis from the survey.

Dr. H. A. Gleason, of the University of Michigan, spent the month of January at the New York Botanical Garden studying the genus *Vernonia* and other subjects.

Mr. Eugene Smith, formerly a member of the Torrey Club and for some time chairman of the field committee, died in Brooklyn on Christmas Day. He was fifty-two years old, and the editor of the *Aquarium* at the time of his death.

At the University of Minnesota Dr. F. E. Clements will lecture on "Plants and the Cost of Living" on March 5, and Dr. E. M. Freeman will lecture on "Sickness in Plants,—Causes and Remedies," on March 12. These two lectures are part of a series of 21 offered by the university upon "Modern Development in Science."

Dr. H. N. Whitford known for his work on the family *Dipterocarpaceae*, which includes many of the most important timber trees of the Philippine Islands, has resigned his position of associate professor of botany, at the University of the Philippines and will return to the United States.

Dr. J. M. Coulter and Dr. N. L. Britton were among the members of the council of the American Association for the Advancement of Science appointed at the recent Cleveland meeting, to serve for three years.

At the same meeting the Botanical Society of America held a symposium on "Permeability and Osmotic Pressure" and the Phytopathological Society on "International Phytopathological Problems."

Dr. H. C. Cowles was elected vice-president and Dr. W. J. V. Osterhout, secretary of section G, Botany, at the Cleveland meeting of the American Association for the Advancement of Science.

Mr. Thomas Howell, the well-known Oregon botanist, died December 3, 1912. He was born in Missouri on October 9, 1842, and was consequently in his 71st year at the time of his death. He was a pioneer of Oregon, moving there in 1850. He devoted many years of his life to the study of the flora of Oregon, tramping over nearly every portion of the State. His knowledge of the northwestern flora is embodied in the work entitled The Flora of Northwestern America. Perhaps the most noteworthy discovery of Mr. Howell was the finding of *Picea Breweriana*, a very local tree and the last of the Pacific Coast conifers to be discovered.

The Philadelphia Natural History Society announces the following lectures of interest to botanists: February 20, "The Arum Family," by Lydia P. Borden; April 17, "Fresh Water Algae," by George B. Kaiser; May 15, "Mountain Plants," by Lillie M. Jenkins; September 18, "Chemistry of Plant Life," by Charles H. La Wall. The lectures will be held at the Wagner Free Institute of Science, 17th Street and Montgomery Avenue, Philadelphia. Dr. John W. Harshberger is president of the society.

Professor A. S. Hitchcock, systematic agrostologist, U. S. Department of Agriculture has returned from the West Indies. He visited Jamaica, Trinidad, Tobago and, incidentally, Cartigena and Puerto de Columbia. In Jamaica, 643 numbers of grasses were obtained, representing about 168 species, and including all except four of the species known from this island, and many species not hitherto recorded. From Trinidad 337 numbers were collected, representing 140 species, and from Tobago 90 numbers representing 65 species. Mr. Hitchcock was successful in re-collecting nearly all the species whose type localities are in these islands.

Mr. James E. Weaver, instructor in botany in the State College of Washington, by act of the Board of Regents, has been advanced to the position of assistant professor of plant physiology and ecology.

At the annual meeting of the Torrey Club, held January 14, the following officers were elected for the year. *President*, E. S. Burgess; *Vice-Presidents*, H. M. Richards and J. H. Barnhart; *Secretary-Treasurer*, B. O. Dodge; *Editor*, E. L. Morris; *Associate Editors*, Jean Broadhurst, E. D. Clark, A. W. Evans, M. A. Howe, H. M. Richards, A. B. Stout, and Norman Taylor. Dr. William Mansfield was reëlected delegate to the council of the New York Academy of Sciences.

Hereafter manuscripts intended for publication in the *Bulletin* should be addressed to Mr. E. L. Morris, Central Museum, Eastern Parkway, Brooklyn, N. Y., and manuscripts intended for publication in TORREYA should be addressed to Norman Taylor, Brooklyn Botanic Garden, Brooklyn, N. Y.

Mrs. Marie A. Underwood, R. D. 25, Bethel, Conn., requests that anyone having books loaned by the late Professor Lucien M. Underwood will kindly forward them to the Department of Botany, Columbia University.

From the *Stanford Alumnus* (December) we learn of a collection of portraits of botanists which is in the library of the department of botany at Leland Stanford University. It comprises pictures of Darwin and Huxley, a steel engraving of Linnaeus by Clement Bernic, a stipple engraving of Tournefort and J. D. Hooker. There are also portraits of Humboldt and Asa Gray.

Dr. R. C. Benedict, 2702 Bainbridge Avenue, Fordham, N. Y. City, has been appointed editor of the *American Fern Journal*, to succeed Dr. Philip Dowell.

At the recent meeting of the American Phytopathological Society at Cleveland the following officers were elected for 1913:

President—F. C. Stewart, New York Agricultural Experiment Station, Geneva, N. Y.

Vice-president—Haven Metcalf, U. S. Department of Agriculture, Washington, D. C.

Secretary-treasurer—C. L. Shear, U. S. Department of Agriculture, Washington, D. C.

Councillor—W. J. Morse, Agricultural Experiment Station, Orono, Me.

The society decided to hold its next annual meeting at Atlanta, Georgia, in conjunction with the American Association for the Advancement of Science.

Professor William J. G. Land, of the department of botany of the University of Chicago, has returned with a large collection of botanical specimens from Australia and the islands of the Pacific.

We learn from *Science* that William Greenwood Wright, an entomologist, died on Sunday afternoon, December 1, 1912, in the eighty-third year of his age. He had been in apparently good health and spirits for some time past. His name is frequent in the two large volumes, "Botany of California," as he was an enthusiastic collector of plants. He was a close friend of the two pioneer botanists and collectors, Edward Palmer and C. C. Parry, and made many excursions, of varying lengths, with them.

We learn from the *Bulletin of Foreign Plant Introductions* (No. 81) of a little-known fiber plant, *Abroma augusta*. Raised from seeds from Calabar, Eastern Province, southern Nigeria. It is "a large open bush widely distributed throughout the hot moist portions of India, now cultivated in Africa. The bark affords a strong white bast fiber, which is easily separated by wetting in water or by decortication. It is readily propagated by cuttings and may be made to yield annually two or three crops of shoots, from 4 to 8 feet long, but requires rich land and plenty of moisture. The fiber which is said to be stronger than sunn hemp is strong, white and clean, and is chiefly used for cordage by the natives."

From the same source is taken the following account of an interesting plant, *Asparagus acutifolius*, which is a wild asparagus from Nice, Alpes Maritimes, France. "This plant is abundant here in the wild state and the young shoots are gathered and form a regular article of commerce in the market. The shoots are much thinner than those of *Asparagus officinalis* (in its cultivated form) but are very delicate of taste. The plant grows in the very worst places as concerns absence of soil (in fissures of rocks, high on the slopes of gravel, etc.), as well in the full burning

sun as in deep shade and it seems to me that so drought-resistant a plant would be worth introducing for use in desert regions." The plant is of interest especially from the fact that most of the genus is South African.

Dr. A. J. Grout has resigned as editor of the *Bryologist* and has been succeeded by Dr. O. E. Jennings, of the Carnegie Museum, Pittsburgh.

Dr. R. Ruggles Gates, lecturer in biology, St. Thomas Hospital, London, is giving a course of lectures on heredity and mutations at the Imperial College of Science and Technology.

Dr. Karl M. Wiegand, of Wellesley College, has been appointed professor of botany in the State College of Agriculture of Cornell University.

Dr. A. B. Stout, director of the laboratories at the New York Botanical Garden, has been appointed editor of the garden *Journal* to succeed Dr. F. J. Seaver, who will hereafter devote more of his time to *Mycologia*.

The Torrey Botanical Club

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their papers appear, will kindly notify the editor when submitting manuscript.

Reprints should be ordered, when galley proof is returned to the editor. The New Era Printing Co., 41 North Queen Street, Lancaster, Pa., have furnished the following rates:

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200 copies	1.70	2.35	2.90	3.75	4.35	4.70

Covers: 25 for 75 cents, additional covers 1 cent each.

Plates for reprints, 40 cents each per 100.

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Delegate to the Council of the New York Academy of Sciences,
WILLIAM MANSFIELD

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

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(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 39 published in 1912, contained 630 pages of text and 45 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are, agents for England.

Of former volumes, only 24–37 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–39 three dollars each.

Single copies (30 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–13 are now completed; Nos. 1 and 2 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

DR. BERNARD O. DODGE
Columbia University
New York City

Vol. 13 March, 1913 No. 3

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

CONTENTS

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THE FLORA OF MOHAWK HILL, N. Y., NORTH OF THE WATERSHED

By T. A. Bendrat

On the basis of several seasons' work the writer endeavors to show in the present paper the general distribution of plant-forms north of the watershed that separates the drainage system of the Black River from that of the famous Mohawk, and which have been established at an elevation of about 1,700 feet, between latitude 43° 30′ and 43° 35′.

The area investigated comprises the drainage basin of the Sugar River, a western tributary of Black River, and more especially that of Amster Brook, which is a southern tributary of Sugar River. The area is limited on the south by the watershed itself and on the north by the valley of the Sugar River into which it gradually merges.

A partial list of the more common seed-bearing plants of the region is followed by a more or less condensed discussion of the various formations, their mode of occurrence and their relation to one another, and also by a subjoined formation-map which has been constructed on the basis of a topographic map and which may serve to emphasize, at least for a portion of the area under discussion, the facts brought out in this paper. The topographic map is also the work of the writer.

List of the More Common Seed-bearing Plants, with Notes on their Habitats and Flowering and Fruiting Periods*

GYMNOSPERMAE

Abies balsamea (L.) Mill. Found both in lowlands and uplands, in the valley and gulf formation as well as in the plateau-forest formation. Flowering early in June.

* Wherever the date, as July–August, is given it applies only to the period of flowering. The writer has also indicated the period of fruiting, for many species, as will be noted in the text.

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Picea canadensis Mill. In gulfs and ravines as well as in the upland-forest formation, scattered. April–May.

Picea brevifolia Pk. In swampy places in gulfs and ravines as well as in the uplands. May and June. It is taken by some writers to be a small form of the black spruce.

Pinus resinosa Ait. May to June. In the plateau-forest formation and occasionally in the gulfs and valleys.

Larix laricina (Du Roi) Koch. Member of the plateau-forest formation. In March and April.

Picea Mariana (Mill.) B.S.P. Occurs with the red spruce. May and June.

Tsuga canadensis (L.) Carr. Scattered singly over the uplands and occasionally found in the bottom of valleys and gulfs. April and May.

Thuja occidentalis L. Along the streams in the bottom of valleys and ravines as well as on the slopes. Preferring wet grounds. May and June.

ANGIOSPERMAE

Monocotyledones

Typha latifolia L. Very common in colonies and scattered through swamps, sloughs and ponds, also through swampy places amidst pine-woods in plateau formation, attaining a height of over five feet. July.

Sparganium simplex Huds. Only found along banks of Upper Amster Brook, in small, scattered groups. July.

Agrostis alba L. In damp and wet slopes of gulfs and their tributaries. August.

Agrostis alba vulgaris (With.) Thurber. Common in pasture and meadow formation, scattered. August.

Anthoxanthum odoratum L. In pastures and back yards, in open places, scattered, also in meadows. June.

Panicum capillare L. Scattered along waysides, over slopes and open places. July.

Phleum pratense L. One of the members of the meadow formation. May.

The grass family of this region is characterized by its scarcity, so far as the number of genera are concerned. Especially in the

uplands about the so-called "back woods," where pastures have resulted from the clearing of the woods, and in the morainic region where the surface is strewn over with boulders of all sorts, the grass family is meagerly represented. The same holds true with regard to its development in the lowlands, although to a less extent.

Carex pauciflora Lightf. In tufts together with *Iris* and *Juncus* in wet and swampy places along streams and near springs. July.

Carex gynandra Sehw. In bottom of gulfs and their tributaries. July. Usually in solitary clumps.

Carex tribuloides moniliformis Britton. In bottom of Agnes Creek (see map). July. Usually solitary.

Arisaema triphyllum (L.) Torrey. In woods on the uplands and also in wooded slopes of gulfs and their tributaries. Flowering in June and fruiting in August.

Juncus canadensis J. Gay. In wet and swampy places in uplands as well as in the bottom of main streams and their tributaries, also on their slopes near springs. August.

Juncus marginatus L. Together with *J. effusus* and *Iris versicola* in wet and swampy places in bottom and slope of gulfs and their tributaries, as well as in swampy pastures on the uplands. July.

Veratrum viride Ait. Solitary, scarce, in bottom of gulfs and ravines.

Uvularia sessilifolia L. In rich woods and woody slopes of gulfs and ravines, single and scattered. June.

Allium cernuum L. In clearings in wooded slopes of Lamey's Hill, north of middle Amster Brook. July.

Erythronium americanum Ker. In woods. Occasionally in small groups. May.

Lilium bulbiferum L. In bottom of main and tributaries of Amster Brook and other larger streams, north of the watershed of Mohawk Hill, also in swampy ground together with *Typha* between Mohawk Hill and Boonville. July.

Medeola virginica L. Indian Cucumber Root. In low, wooded grounds, along streams, solitary. June.

Unifolium canadense (Desf.) Greene. On slaty slope and in brow of tributary (Agnes creek) in shade of trees in more or less extensive groups. Flowering in June and July, fruiting in July and August.

Trillium cernuum L. Single and in scattered small clusters in shade of evergreens in upland "back woods" and in wooded bottom of gulfs, flowering in May, fruiting in August.

Trillium erectum L. In the shade of evergreens like the foregoing, scattered singly and in small groups. May and June.

Iris versicola L. Solitary and in small clusters in swamps amidst pine woods and in swampy ground along streams. July.

Sisyrinchium bermudianum Mill. Scattered singly or in very small clusters in hilly pastures and along roads. June.

Cypripedium acaule Ait. Single and in small groups in shade of evergreens in gulfs and plateau-lands. June.

Habenaria psycodes (L.) Gray. In swamps amidst pine woods, very rare, solitary. July.

Gyrostachys plantaginea Britton. In pastures and meadows, scattered. September.

Gyrostachys gracilis Kunze. In slopes and bottom of gulfs, preferring wooded lands. August.

Dicotyledones

Choripetalae

Juglans cinerea L. Scattered singly through main gulf of Amster Brook, and through other gulfs and ravines of the region, also on the plateau.

Hicoria minima (Marsh) Britton. In moist woods and swamps of the plateau-forest and also the plateau-swamp formations. It flowers in May and June and fruits from September to October.

Populus tremuloides Michx. In dry or moist soil, mostly confined to the plateau-valley formation, in bottom of Amster Brook Valley. March–May.

Salix alba var. *vitellina* L. Occasionally found along roads and also near water courses. Also occurring in small thickets. April and May.

Salix fragilis L. Found along roadsides, usually solitary and rare.

These two species are practically the only ones that represent *Salix* in this region.

Alnus incana (L.) Willd. Forming more or less extensive thickets along watercourses and in low swampy ground that has passed from the pond into the swamp condition. It flowers in May and fruits in August.

Fagus grandifolia Ehrh. In more or less extensive formations on first and second (more recent) terraces in bottom of most drainage areas in the region. Associated with pine and thus constituting a mixed formation (pine-beech or beech-pine, as the case may be). It flowers in April and May, fruits in September and October.

Ulmus americana L. In moist soil, especially along streams. Flowers in March and April, fruits in May.

Urticastrum divaricatum (L.) Kuntze. In moist and wooded banks of Amster brook and its tributaries, rare. Flowering in July, fruiting in August and September.

Polygonum arifolium L. In ponds in pine woods, occurring in groups. July.

Claytonia caroliniana Michx. In meadows and pine barrens, in small colonies. One of the first plants to appear, after the snow is gone. End of April.

Cerastium longipedunculatum Muhl. Very common in open slopes and bottom of gulfs. July.

Caltha palustris L. In colonies in swampy pastures, along ditches and natural watercourses. June and July.

Aquilegia canadensis L. Rare. In small groups in alluvial bottom of Amster Brook. Flowering in May and June, fruiting in July and August.

Actaea alba (L.) Mill. In rich wooded slopes of Amster Brook and other streams, rare. Flowering in June, fruiting in August.

Clematis trifolia Salisb. In small groups in pine-barrens and damp wooded slopes, belonging to the plateau-valley and gulf formation. May.

Clematis virginiana L. Solitary in moist wooded slopes of Amster Brook. August.

Ranunculus abortivus L. Solitary, in shady places along streams and in the slopes of gulfs and valleys. Flowering in May and June.

Ranunculus recurvatus Poir. In meadows and moist open places, scattered. July until September.

Ranunculus pennsylvanicus L. In open slopes and valley bottoms. Forming mats.

Ranunculus repens L. Solitary, scattered, in meadow.

Thalictrum dioicum Muhl. In rocky ground in woods, in slaty slope of Amster Brook. July.

Caulophyllum thalictroides Michx. In more or less extensive groups in bottom of Amster Brook gulf, in shade of trees. Flowering in June and fruiting in August.

Cardamine hirsuta L. Very rare, in slaty slope of gulfs. Solitary. July.

Chrysosplenium americanum Schw. In swampy ground in pine woods on Mohawk Hill plateau, in more or less extensive colonies. May.

Tiarella cordifolia L. Along streams and on wooded slopes of gulfs. May.

Agrimonia mollis Britton. In boulder clay in bottom of ravines and gulfs. Solitary. July–Oct.

Potentilla Monspeliensis L. In open places in bolder clay and along roads. Solitary. September.

Potentilla recta L. Rare; in pine barrens, and occasionally in waste ground; solitary. August.

Rubus odoratus L. Only found in gulf of Graham Creek. Together with *Impatiens fulva*, *I. pallida* and rattlesnake root it constitutes the flora of that gulf; rather confined to the lower slopes. *Rubus strigosus* Michx. Roadsides and along fences on uplands and also in the slopes and bottoms of ravines and gulfs. Flowering May–July; fruiting July–September.

Rubus canadensis L. In pastures and along roads of the upland. Flowering May–June; fruiting July and August.

Fragaria canadensis Michx. Member of the plateau-valley and gulf formation. In the slopes of gulfs, ravines and valleys. Associated with *Viola obliqua*. May–July.

Fragaria americana (Porter) Britton. Scattered through woods in the uplands; in clearings and about the hillocks caused by the uprooting of trees. Very sweet. May–June.

Rosa lucida L. Very extensive along roads and also along margin of woods.

Prunus serotina Ehrh. Scattered in valleys and gulfs of the region, especially in ravine of Agnes Creek (see map). Flowering in June; fruiting in August and September.

Prunus pennsylvanica L. Along stone fences and stone walls on the uplands, also along margin of plateau-meadow formation. Fruiting in July.

Prunus virginiana L. Very common on uplands and occasionally descending into the gulfs and ravines. Flowering June–July; fruiting in July or August.

Geranium Robertianum L. In wooded slopes; solitary and in small groups. July.

Oxalis Acetosella L. In groups, scattered over the slaty slopes of Amster Brook and its tributaries, together with *Oxalis stricta*. July.

Acer Saccharum Marsh. In rich soil of hills, valleys, and mountain sides. Very common as member of the plateau-forest and the plateau-valley and -gulf-formation. May–June.

Acer rubrum L. Associated with the former. May.

These seem to be the only species of maple occurring in this region, which is characterized, in general, by its vegetative monotony.

Hypericum ellipticum Hook. In small groups as well as in more extensive colonies, in damp and wet places, by waterfall in Amster Brook. July and August.

Hypericum perforatum L. Slaty slopes and banks, in groups. July.

Hypericum mutilum L. Alongside roadside in rather silty soil, solitary or sometimes in extensive groups. July.

Viola rotundifolia Michx. In low, damp ground, in bottom of Amster Brook and other gulfs and valleys. Associated with *Viola blanda*. May.

Viola blanda Willd. In groups along streams, in bottom of gulfs. May.

Viola cucullata Ait. In groups along streams; associated with *Fragaria canadensis*. May.

Circaea alpina L. In groups or colonies about springs, in the slopes of rocky gulfs. July.

Chamaenerion angustifolium (L.) Scop. In slaty slopes of gulfs and along waysides, in small groups. July.

Epilobium strictum Muhl. In swampy grounds, amidst pine woods on Mohawk Hill plateau, scattered. July.

Epilobium palustre L. In wet places along streams on the uplands. July.

Kneiffia pumila Spach. Solitary and in small groups together with daisies, buttercups, hawkweed and *Stachys*, in meadow formation; also in pine barrens. June.

Aralia nudicaulis L. Wooded and shady cliffs and on slopes of valleys and gulfs, scattered and scarce. Flowering in June and fruiting in August.

Panax quinquefolium L. Associated with *Aralia nudicaulis* in middle Amster Brook and also in Graham Brook. Fruiting in August.

Aralia racemosa L. Solitary, very rare, also associated with sarsaparilla; in shady and wooded slopes of Amster Brook and Graham Brook. Fruiting in August.

Cornus canadensis L. In open pine woods as well as in pastures in more or less small groups; member of the pasture- and plateau-forest formation. It seems to prefer the shade of trees and a damp atmosphere and flowers in June and July in lower places, while at higher levels it blooms as late as August and September. In the former case it fruits in July.

GAMOPETALAE

Monotropa uniflora L. Scattered singly and in small groups of two and three in low, moist and sheltered grounds; very rare. July.

Gaultheria procumbens L. Forming extensive mats in spruce formation. Closely associated with the latter.

Pyrola elliptica Nutt. Solitary, very rare, in wooded slope of Amster Brook gulf. July.

Gentiana Saponaria L. Scattered in small or large groups along road near margin of woods; restricted to the uplands. July.

Apocynum androsaemifolium L. Forming occasionally extensive thickets on slopes of gulfs and ravines in bowlder clay. July.

Asclepias incarnata L. Moist, swampy ground, in bottom of gulfs. July and August.

Cynoglossum officinale L. In small groups in bottom of gulfs; specially in moist places. August.

Myosotis palustris L. In scattered groups in bottom of gulfs and on cobble-stone islands in the streams.

Verbena bracteosa L. In dense and extensive colonies along banks of Upper Amster Brook, near woods; scattered elsewhere. July.

Agastache scrophulariaefolia (Willd.) Kuntze. Solitary, in bottom of gulfs. August.

Lycopus virginicus L. Scattered over bottom of gulfs. July.

Mentha canadensis L. In groups along streams. July.

Mentha rotundifolia (L.) Huds. Associated with the former; in groups along bottom of gulfs and ravines. July–Sept.

Monarda didyma L. In small groups in slaty banks of Amster Brook. August.

Scutellaria laterifolia L. In wet and swampy places amidst pine woods; scattered. July.

Stachys palustris L. Solitary, on slope of tributary gulfs. August.

Teucrium canadense L. Occurs singly in bottom of Amster Brook gulf. July.

Scrophularia marylandica L. In small groups of three or four along streams. August.

Chelone glabra L. In groups along roadside and in gulfs, usually in moist places. July.

Mimulus ringens L. In swamps and along streams; single and in small groups; confined to the plateau-meadow formation of the uplands. July.

Veronica americana Schw. Along brooks in swampy ground, amidst pine woods, scattered. July.

Veronica scutellata L. In swamp near Amster Brook above Mohawk Hill cheese factory, the only place where it occurs within this region. July.

Leptamnium virginianum (L.) Raf. In more or less extensive groups in first alluvial terrace in Beech Grove. August.

Galium asprellum Michx. In swampy grounds amidst pine-woods, climbing on other marsh and swamp plants. In large groups. July.

Galium triflorum Michx. Scattered through woods and in slopes of gulfs. July.

Viburnum alnifolium Marsh. Scattered through woods on Mohawk Hill plateau; may also be found in bottom of gulfs. Flowers in May and fruits in August.

Diervilla Diervilla (L.) MacM. On slopes, specially in gravelly, poor soil. Flowers in July and fruits in August.

Campanula americana L. In waste ground and along roads; solitary and in small groups. July.

Lobelia inflata L. In pastures and by wayside; also in bottom of gulfs. July–September.

Lobelia cardinalis L. Occurs in groups and colonies along brooks, but confined to the uplands and backwoods of the Mohawk Hill Region. July.

Nabalus altissimus (L.) Hook. In shady, moist and rocky slopes of gulfs. August.

Eupatorium ageratoides L. In wooded, shady and moist slopes of gulfs. August.

Eupatorium perfoliatum. In small group. Cobblestone island in midst of Amster Brook, only place where found. August.

Eupatorium purpureum L. Along streams in small groups. August.

Solidago canadensis L. Waste open places, also along wayside and brow of hills. September.

Solidago flexicaulis L. In bottom of valleys and gulfs, in bowlder-clay. September.

Solidago lanceolata L. With *S. canadensis* and *S. flexicaulis* in groups, flowering and fruiting at same time.

Aster macrophyllus L. Along wooded banks of Amster Brook, very rare, solitary. August.

Aster lateriflorus, Britton. Occurring singly or in very small groups in moist and wooded slopes of gulfs. August.

Aster puniceus L. On slopes and sloping planes, but attaining greatest height (up to 6 feet) and being best developed in moist, swampy clearings in pine woods. August and September.

Aster Tradescanti L. Very common in extensive colonies together with different species of *Solidago*. September.

Erigeron ramosus (Walt.) B.S.P. Daisy Fleabane. In open places on plateau in bowlder-clay, solitary. September.

Antennaria plantaginifolia (L.) Rich. Very common in dry knolls and slopes, sometimes almost exclusively constituting the matting of the surface along highest levels of slopes. Early spring.

Anaphalis margaritacea B. & H. Along brow of slopes of gulfs, in groups. August and later.

Gnaphalium decurrens L. Along brows of hills and gulfs, also in pretty large colonies along the wayside. September.

Bidens laevis (L.) B.S.P. In groups and even colonies in swampy wood-clearings and in open pine formation. August and September.

Bidens connata L. Solitary, by water side in silty soil; flowering in August. It is rare.

Heliopsis laevis L. Scattered through meadow-formation in rich clayey soil. July.

Senecio lobatus L. On shaded slope; solitary or in groups of 2 and 3. August.

Senecio aureus L. At foot of wooded slope of Amster Brook, in small groups, rare. July.

Formations

So far as the region under discussion is concerned, there is a considerable variety of formations caused by a diversity of physiographic conditions. A more or less obscured and modified plateau region is dissected by gulfs and valleys, and consists of

areas that are partly uneven and hilly, and partly level. We find the formations resulting from these physical factors established somewhat as follows:

1. Plateau-Forest Formation.
2. Plateau-Meadow Formation.
3. Plateau-Swamp Formation.
4. Plateau-Gulf-and-Valley Formation.
5. Plateau-Pasture Formation.

While the conditions that developed or at least helped to develop the first four of these formations have been brought about by nature as transitional and final forms of vegetation, the fifth formation, or plateau-pasture formation, has been developed through the activity of man. An enumeration of the different species that constitute the various formations, specially those which make up the facies of each formation, will tend to show which plant-forms are more or less significant for each of the different formations, and which are to be considered as invaders, or rather as common for all or most of them.

1. *Plateau-Forest Formation*

The forest, so far as it occupies the region north of the watershed of Mohawk Hill, at an average elevation of 1,700 feet above sea-level and in horizontal extension between latitude 43° 30′ and 44° north, is a mixed formation. It is a mixture of the typical deciduous-leaved and needle-leaved forest-formations, and is passing, at present, from the closed into the open stage, and from that of primary to that of secondary growth.

The predominant character of its flora is mesophytic, although more or less hydrophytic forms may occasionally occur wherever members of the swamp or spring formation have invaded the forest, as is very often the case.

Among trees the more characteristic ones are the following:

Abies alba	*Hicoria minima*
Abies balsamea	*Juglans cineria*
Acer Saccharum	*Larix laricina*
Acer rubrum	*Negundo aceroides*
Fagus grandifolia	*Picea Mariana*

Picea canadensis *Tilia americana*
Picea brevifolia *Tsuga canadensis*
Pinus resinosa *Ulmus americana*

Among the shrubs the most characteristic ones are:

Alnus viridis. *Rubus strigosus*
Gaylussacia frondosa *Rubus setosus*
Rosa lucida *Viburnum alnifolium*

The layer of spore- and seed-bearing plants (herbs), rising above the carpet and mat formation of the forest, consists of the following species:

Allium cernuum *Medeola virginiana*
Arisaema triphyllum *Pyrola elliptica*
Aster puniceus *Unifolium canadense*
Clematis virginiana *Thalictrum dioicum.*
Coptis trifolia *Tiarella cordifolia.*
Malva sylvestris *Trillium cernuum*
Leptamnium virginanum *Trillium erectum*
Erythronium americanum *Urticastrum divaricatum*
Fragaria americana *Uvularia sessilifolia*
Galium trifolium *Viola pubescens*
Gentiana Saponaria *Viola rotundifolia*
Geranium Robertianum

The mat- and carpet-covering of the forest consists of the following forms:

Gaultheria procumbens *Polytrichum ohioense*
Lycopodium complanatum *Russula cristosa*
Lycopodium lucidulum *Russula foetens.*
Lycopodium dendroidus

So far as the distribution of the forest formation is concerned, only limited and isolated patches remind one of the fact that the entire region was once forest, excepting the areas where the meadow formation has established itself. There are lines of forest formation along the crests of gulfs and valleys and there is forest formation to be found on the slopes and in the bottoms of such gulfs and valleys, wherever the lumbering activity of man has not promoted a gradual increase of the typical plateau-gulf and -valley formation at the expense of the plateau-forest

formation. Wherever conditions are favorable the latter may be observed again claiming the ground it once had occupied and migrating vertically, either down or up the slope, and horizontally by invading waste land and pastures, as well as by competing to some limited extent with the meadow formation.

2. *Plateau-Meadow Formation*

The plateau-meadow formation, as the second stage of succession, has established itself especially upon areas that exhibit a somewhat high degree of smoothness—and, while at some places it has attained the culmination-point of its development, it may be found at others still competing with and passing out of the plateau-swamp formation.

Its facies is to a great extent determined by the altitude of the region, by the character of the soil, which is a buff-colored, more or less gravelly bowlder-clay about one or at the most two feet thick, and by the bed-rock. This bed rock of Utica slate helps to control the water-content.

The species, constituting the meadow formation, are as follows:

Agrostis alba
Agrostis alba vulgaris.
Anthoxanthum odoratum
Bidens frondosa
Epilobium palustre
Fragaria virginiana
Heliopsis laevis
Hypericum ellipticum
Hypericum perforatum
Œnothera pumila
Oxalis Acetosella
Oxalis stricta
Panicum capillare
Phleum pratense
Poa annua
Ranunculus acris
Ranunculus repens.
Rumex Acetosella
Sisyrinchium bermudianum
Gyrostachys sp.
Verbena angustifolia
Viola obliqua

As may be readily seen from the list, the meadow formation sometimes merges into the pasture formation and *vice versa*, wherever the two happen to occur side by side.

3. *Plateau-Swamp Formation*

The swamp formation occurs either within the forest formation or within the pasture as well as the gulf and valley formation,

wherever the basal structure of the area concerned has allowed its development. While at some places it appears to be fully developed, at others it is observed to lose ground at the expense of the pasture and meadow formations. Even in the forest it appears to yield gradually to the invading thicket and forest zone.

The more characteristic forms observed are as follows:

Alnus incana	*Iris versicola*
Aster puniceus	*Hicoria minima*
Bidens laevis	*Juncus canadensis*
Caltha palustris	*Juncus marginatus*
Carex gynandra	*Mimulus ringens*
Carex pauciflora	*Myosotis palustris*
Carex tribuloides moniliformis	*Polygonum arifolium*
Chrysosplenium americanum	*Scutellaria lateriflora*
Epilobium molle	*Sparganium simplex*
Galium asprellum	*Typha latifolia*
Galium trifidum	*Veronica americana*
Habenaria psychodes	*Veronica scutellata*

4. *Plateau-Gulf and Valley Formation*

This formation appears, wherever the lumbering activity of man has removed the forest formation along the lines of drainage on the deformed plateau. It is naturally composed of mesophytic forms which occupy especially the slopes of valleys, gulfs, and ravines. Xerophytic forms are usually restricted to the higher and highest levels of slope and to such restricted areas within the bottom of gulfs and valleys which from the nature of the soil-conditions favor their development. Also hydrophytic species have taken advantage of conditions more or less prevailing in the bottom of these drainage channels.

As a subdivision we might include here the spring formation which might be considered as a mixture of hydrophytic and mesophytic forms in so far as springs develop amidst a mesophytic flora and introduce hydrophytic species into the latter, although plants, typical for the swamp formation, may be lacking. This however does not exclude the possibility of conditions that ac-

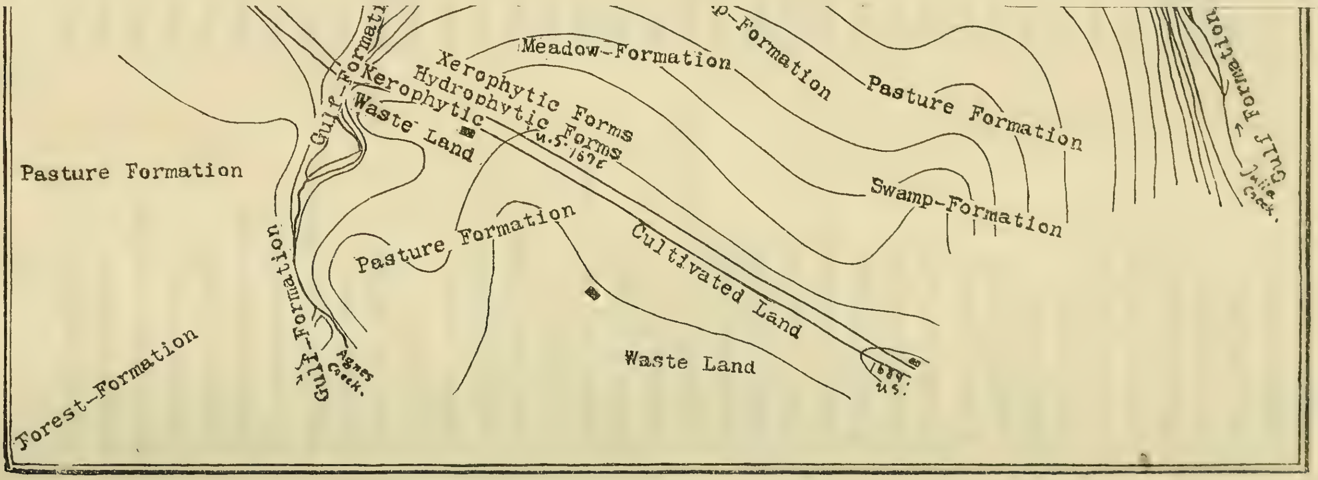
tually favor a combination of spring and swamp formation, and as a matter of fact there occur spring-swamp formations in the higher levels of the slopes and swamp-spring formations in the lower levels and in the bottom of gulfs and valleys.

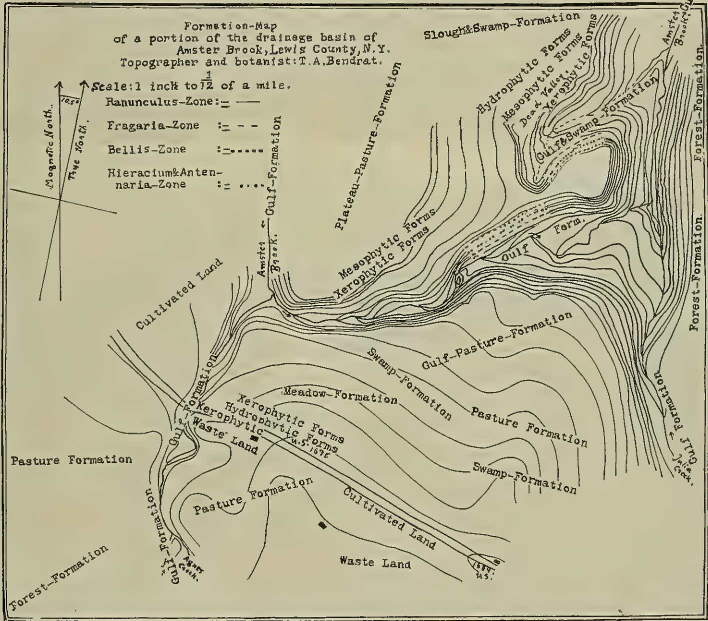
While on the whole bilateral zonation within the area under discussion is extremely rare or practically absent, it is interesting to observe how unilateral vertical zonation has established itself, where conditions of water content as well as orientation and inclination of slope, permit. Especially the slopes of Amster Brook gulf as well as those of Dead Valley afford some striking illustrations in this respect. (See Map.)

Another very interesting feature that tends to illustrate the bearing of the factor of the orientation of gulfs and valleys upon the distribution of the vegetation, is met with in Dead Valley. Where the carpet of the northern slope, exposed to moisture-bearing southeast and east winds, is almost exclusively composed of *Ranunculus pennsylvanicus*, while on the same level on the opposite slope, facing the drier north and northwest winds, *Hieracium pilosella* forms a close carpet. (See Map.)

The following are the species that usually constitute the plateau-gulf and valley formation:

Abies balsamea
Acer Saccharum
Acer rubrum
Agrimonia hirsuta
Alnus incana
Antennaria plantaginifolia
Apocynum androsaemifolium
Aquilega canadensis
Asclepias incarnata
Bidens connata
Melissa clinopodium
Cardamine hirsuta
Carex gynandra
Carex pauciflora
Carex tribuloides var. *moniliformis*
Caulophyllum thalictroides
Cerastium nutans
Chelone glabra
Chrysosplenium americanum
Circaea alpina
Clematis virginiana
Cynoglossum officinale
Epilobium angustifolium
Epilobium molle
Epilobium palustre
Erigeron strigosus
Eupatorium perfoliatum
Eupatorium purpureum
Fagus grandifolia
Fragaria canadensis
Fragaria virginiana


Pasture Formation
Forest-Formation
Gulf-Formation
Agnes Creek.
Gulf Formation
Xerophytic
Waste Land
Pasture Formation
Hydrophytic Forms
Xerophytic Forms
U.S. 1676
Meadow-Formation
Cultivated Land
Waste Land
1689 U.S.
Pasture Formation
Swamp-Formation
Gulf Formation
Julia Creek.


Formation-Map
of a portion of the drainege basin of
Amster Brook, Lewis County, N.Y.
Topographer and botanist: T. A. Bendrat.
Scale: 1 inch to 1/12 of a mile.
Ranunculus-Zone:
Fragaria-Zone
Bellis-Zone
Hieracium & Antennaria-Zone
Magnetic North.
True North.
10.5°
Gulf-Formation
Amster Brook.
Plateau-Pasture-Formation
Slough & Swamp-Formation
Hydrophytic Forms
Mesophytic Forms
Dead Valley.
Xerophytic Forms
Gulf & Swamp-Formation
Mesophytic Forms
Xerophytic Forms
Gulf
Form.
Forest-Formation.
Forest-Formation.
Cultivated Land
Gulf-Pasture-Formation
Swamp-Formation
Meadow-Formation
Xerophytic Forms
Hydrophytic Forms
Xerophytic
Waste Land
Pasture Formation
Swamp-Formation
Gulf Formation
Julia Creek.
Gulf-Formation
Pasture Formation
Pasture Formation
Cultivated Land
Waste Land
Gulf-Formation
Agnes Creek.
Forest-Formation
U.S. 1676
U.S.

Galium asprellum
Galium triflorum
Gaultheria procumbens
Hicoria minima
Hieracium pilosella
Hypericum ellipticum
Hypericum mutilum
Hypericum perforatum
Impatiens fulva
Impatiens pallida
Iris versicola
Juglans cinerea
Juncus canadensis
Juncus marginatus
Larix laricina
Leptamnium virginianum
Lobelia cardinalis
Lobelia inflata
Lophanthus scrophulariifolius
Lycopus virginicus
Medeola virginica
Mentha canadensis
Mentha rotundifolia
Mimulus ringens
Monarda didyma
Monotropa uniflora
Myosotis palustris
Oxalis Acetosella
Oxalis cymosa
Oxalis stricta
Panicum Crus-Galli
Panicum capillare
Panicum sanguinale
Picea brevifolia
Picea Mariana
Pinus resinosa
Populus tremuloides
Prunus virginiana
Pyrola elliptica
Ranunculus abortivus
Ranunculus canadensis
Ranunculus pennsylvanicus
Ranunculus recurvatus
Rubus odoratus
Rubus strigosus
Rubus villosus
Salix alba var. *vitellina*
Salix fragilis
Salix viminalis
Scrophularia marylandica
Scutellaria lateriflora
Senecio aureus
Senecio lobatus
Smilacina biflora
Solidago canadensis
Solidago lanceolata
Solidago latifolia
Sparganium simplex
Gyrostachys gracilis
Stachys palustris
Teucrium canadense
Thalictrum dioicum
Thuja occidentalis
Tiarella cordifolia
Trillium cernuum
Trillium erectum
Ulmus americana
Urticastrum divaricatum
Uvularia sessilifolia
Veratrum viride
Verbena bracteosa
Verbena hastata
Veronica scutellaria
Viburnum alnifolium

Viola blanda
Viola pubescens
Viola rotundifolia

As will be readily seen from the list, this formation is more complex and varied than all the others. Forest, meadow, swamp, spring and pasture formations have played a role, to a greater or less extent, in establishing a gulf and valley formation that is characteristic of the plateau-region of the state of New York at an average elevation of 1,700 feet above sea-level.

5. *Plateau-Pasture Formation*

This is the only formation that has been established through the lumbering activity of man, and the more or less complete destruction of the typical forest-flora tends to introduce conditions that would favor a rather complex succession which, if left to itself, would finally reëstablish the original conditions. But the succession is checked at present by the cattle feeding upon it, and the formation retained in a mixed xero-mesophytic condition, while the presence of several more or less extensive swamps aid in the establishment of at least a partial horizontal zonation, in which hydrophytic forms become gradually replaced by mesophytic ones and these in turn yield to more or less xerophytic species, especially where a plateau-swamp is adjacent to a crest.

The plants found are as follows:

Achillea Millefolium
Acer Saccharum
Alnus viridis
Bellis perennis
Brunella vulgaris
Campanula americana
Fragaria virginiana
Hieracium pilosella
Lycopodium complanatum
Lycopodium obscurum var. *dendroideum*
Panicum capillare
Panicum sanguinale
Poa annua
Ranunculus pennsylvanicus
Sisyrinchium bermudianum
Gyrostachys cernua
Ulmus americana
Verbena bracteosa
Viola obliqua

The subjoined map, comprising part of the area discussed, namely the greater part of the drainage basin of Amster Brook, will serve to illustrate some of the facts brought out in this paper.

The writer desires to acknowledge very gratefully the assistance given him in the identification of some sedges and mosses by Prof. Charles H. Peck, and Mr. Stewart Burnham.

University of North Carolina

SHORTER NOTES

A Yellow Flax from Jamaica, West Indies.—It was somewhat of a surprise to find specimens of a yellow-flowered flax—*Cathartolinum*—in a package of specimens recently collected in a botanically little-known part of Jamaica. These specimens are the first representatives of the genus *Cathartolinum* to be found in the West Indies south of the Bahamas.

Cathartolinum jamaicense Small, sp. nov. Plants perennial, 3 dm. tall or less; stem slender, glabrous, simple or with few elongate branches: leaves nearly erect or appressed to the stem and the branches, mostly 7–12 mm. long; the blades spatulate to nearly linear, acute to short-acuminate, entire, eciliate, those of the upper leaves sessile: stipular glands wanting: flowers in interrupted, usually simple virgate spike-like racemes: sepals about 3 mm. long, the outer lanceolate to oblong-lanceolate, acute or slightly acuminate, glandless, the inner elliptic or ovate-elliptic, rather abruptly short-acuminate, often minutely glandular-toothed, the glands often deciduous: petals yellow, mostly 4.5–7.5 mm. long, fugacious: staminodia wanting: anthers about 0.5 mm. long: capsules globose-ovoid, about 2.5 mm. long, about equalling the sepals or slightly exceeding them.

In damp grassy savannas, Kellits, Upper Clarendon, Jamaica. Collected by William Harris, September 24, 1912, *11159*.

The closest relative of *Cathartolinum jamaicense* seems to be *C. floridanum*. The simple virgate inflorescence and the smaller calyx of *C. jamaicense* distinguishes it from *C. floridanum*. In *North American Flora* this species should stand between *Cathartolinum floridanum* and *C. macrosepalum*.

J. K. Small

REVIEWS

Andrews's Practical Course in Botany*

The versatile author of interesting reminiscences of the Civil War period, several novels, numerous articles in newspapers, in popular and semi-popular magazines, horticultural society transactions, etc., and of "Botany all the year round"† has outdone her previous efforts in the attractive high-school text-book before us. Born and educated in Georgia, she has traveled widely in this country and abroad, and her books show less provincialism than do some other current texts. Most American botanical text-books have been written in or near the glaciated region, where the population is dense and wealth abundant and most high-schools well supplied with apparatus. Miss Andrews's books are well adapted for more thinly settled regions, but not for them alone by any means, for while the last one was in preparation, she visited (among others) several schools in New York City to find out just what sort of a botanical text-book was needed there. Much of the material for the new book was gathered in person at such botanical centers as Washington, St. Louis, and Auburn, Ala. At the latter place she received considerable assistance from Prof. Francis E. Lloyd, which is acknowledged on the title-page and elsewhere. Some of the half-tone illustrations were obtained from the Missouri Botanical Garden, the U. S. Department of Agriculture, and other sources, and some are from her own photographs.

The new book differs from its predecessor in having about 25 per cent. more pages, many more half-tone illustrations (15 of them covering a full page each, and called plates), and fewer line-drawings, and in a somewhat different arrangement of subject-matter. The main chapters are headed (1) The seed, (2) Germination and growth, (3) The root, (4) The stem, (5) Buds and branches, (6) The leaf, (7) The flower, (8) Fruits, (9) The response of the plant to its surroundings, and (10) Cryptogams.

* A practical course in botany, with especial reference to its bearings on agriculture, economics and sanitation. By E. F[rances] Andrews. x + 374 pp., including 526 text-figures. New York (American Book Co.), Dec. 1911. $1.25.

† 302 pp. 543 figs. New York (American Book Co.), 1903. Reviewed by C. R. B[arnes] in Bot. Gaz. **35**: 439. June, 1903.

Chapter 4 contains three pages on forestry, and Chapter 7 several pages on Mendelism and plant breeding and fourteen pages on the ecology of the flower. Chapter 9, devoted especially to ecology, is about twice as long as the corresponding one in "Botany all the year round," and contains several pages on zonation and other phytogeographical problems, which were not included in the earlier book. Dissemination is treated in Chapter 1. Chapter 10 closes with four pages on evolution, and systematic botany is treated very briefly in an appendix, about the same as in the other book.

The practical questions and suggestions for field work, which were such a valuable feature of the first book, are here repeated, with some changes and additions. They are very well chosen, and most of them require the student to do some thinking, instead of merely turning back a few pages to find the answers. The literary style is simple without being tedious, and there are only enough technicalities to obviate undue circumlocution.

This book, like many other modern botanical texts, illustrates strikingly the recent decline in popularity of systematic botany. A generation ago most American "botanies" consisted chiefly of rather dry definitions of a multitude of forms of plant organs, after mastering which the student was able to use keys for the identification of species. Directions for the preparation of herbarium specimens were often added, and the more advanced books discussed the principles of classification and nomenclature. Nowadays histology, physiology, ecology, genetics, etc., have almost crowded taxonomy out of the curriculum. Some of the latest and most pretentious botanical text-books indeed describe the morphological features of many of the larger plant families and speculate on their phylogeny, but give no idea of what constitutes a species or how plants are named, and offer the student no instructions as to how to identify an unfamiliar plant if he should perchance wander far enough afield to meet one.

As Prof. Bessey has recently pointed out,* the modern sort of botany gives a student nothing to occupy his mind with during

* Science II. 33: 635. April 28, 1911. Mr. Seaver's article in TORREYA for November, 1912, should also be read in this connection.

vacation, unless he goes to a laboratory or provides himself with expensive apparatus. The suggestions for field work in Miss Andrews's book, however, are well adapted for giving an ambitious student something to do outside of the laboratory and schoolroom.

An abridged flora of the Eastern United States, covering 368 pages, by another author, is bound in with some copies of this new book, as with its predecessor, for the benefit of those who may desire to increase their acquaintance with the vegetable kingdom by outdoor work.

Roland M. Harper

Heredity and Eugenics*

Under this title there has appeared in book form a series of popular lectures which were delivered at the University of Chicago during the summer of 1911. The table of contents which is here printed gives an adequate and concise statement of the scope of these lectures.

I. Recent Developments in Heredity and Evolution: General Introduction.

II. The Physical Basis of Heredity and Evolution from the Cytological Standpoint. John Merle Coulter, Professor and Head of the Department of Botany, the University of Chicago.

III. The Method of Evolution.

IV. Heredity and Sex. William Ernest Castle, Professor of Zoology, Harvard University.

V. Inheritance in the Higher Plants.

VI. The Application of Biological Principles to Plant Breeding. Edward Murray East, Assistant Professor of Experimental Plant Morphology, Harvard University.

VII. Recent Advances and the Present State of Knowledge concerning the Modification of the Germinal Constitution of Organisms by Experimental Processes. William Lawrence Tower, Associate Professor of Zoology, the University of Chicago.

VIII. The Inheritance of Physical and Mental Traits of Man and Their Application to Eugenics.

* Pages i–vii + 1–315. [Illust.] The University of Chicago Press, Chicago, Illinois, 1912. Agents, The Baker and Taylor Company, New York. Price $2.50.

IX. The Geography of Man in Relation to Eugenics. Charles Benedict Davenport, Station for Experimental Evolution, Carnegie Institution of Washington.

While not pretending to be exhaustive in scope, these combined lectures treat of the most important problems of heredity and eugenics. It is doubtful if a clearer and a more authoritative presentation of these topics, as they are understood to-day, could be made. The authors are leading investigators in their respective fields and they discuss the problems in the concrete, drawing freely upon experimental data and presenting conclusions with the use of few technical terms. There are ninety-eight illustrations and diagrams which are of considerable value to the reader. The book is planned to meet the demands of the general reader. It seems to have done this with unusual success. In the last two chapters there is a discussion of various phases of heredity in man and a resumé of the eugenics movement.

While there is a general acceptance by the various authors of the application of Mendelian inheritance, there is not the extreme application which has been somewhat general of late. Each of the joint authors expresses considerable caution, which is to be commended, in discussing the "unit character," which it is to be noted is the fundamental conception of Mendelian inheritance.

For example we find such statements as the following: "There are strong reasons for believing that mendelizing characters can be modified by selection, though this idea is vigorously denied by many Mendelians. I prefer to think with Darwin that selection can do more than this, that it can heap up quantitative variations until they reach a sum total otherwise unattainable and that it thus becomes creative" (Castle, p. 56). On this question East (p. 112) states that "stability is a relative thing. Many unit-characters are high in the scale of stability, others may be low," and Davenport (p. 269) says: "We find useful the principle of the unit character. Whether it be ultimately accepted or discarded, it is useful today, and so we accept it as a guiding hypothesis." These points of view are of special value as they come from investigators whose particular experimental work has required a careful analysis of characters.

The general theme of the book is the broad evolutionary view of heredity which takes into account the origin and inheritance of dissimilarity as well as of similarity. The book is clearly the best popular exposition of the topics outlined in the table of contents. A. B. Stout

NEWS ITEMS

We regret to record the death on February 1 of Mr. John Innes Kane at his residence on West 49th Street, New York. Mr. Kane was the chairman of the finance committee of the Torrey Club, and he also served on the entrance committee of the board of managers of the New York Botanical Garden. He was widely identified with various other activities in New York.

Dr. J. Arthur Harris spent January at the Missouri Botanical Garden and is spending February and March at the Desert Botanical Laboratory at Tucson, Arizona.

Fifteen botanists were the guests of Prof. R. A. Harper on February 16, at a dinner given by him to D. H. Fairchild and W. T. Swingle, both of the U. S. Department of Agriculture.

Early in February some suffragettes of the Pankhurstian persuasion succeeded in destroying a number of valuable orchids at the Royal Botanic Gardens at Kew. On February 20 these franchise enthusiasts successfully obliterated a pavilion at the gardens. The authorities have seriously considered closing the gardens to the public for a short period.

We learn from the daily papers of the sale, by the Trustees of Columbia University, of the northwest corner of Forty-seventh Street and Fifth Avenue, for the sum of three million dollars. Over a century ago the corner formed a small portion of the large Elgin Botanic Gardens, which Dr. David Hosack, whose name is so intimately associated with medical progress in America, purchased from the city for $4,807.36. There were about twenty acres in the garden, the first to be started in New York, embracing all of the four blocks from the north side of Forty-seventh Street

to the south side of Fifty-first Street, and westward to within about 100 feet of Sixth Avenue. At the time it was part of the common lands of the city. Dr. Hosack found that the expense of maintaining the gardens was greater than he could bear, and after various negotiations the state acquired the property in 1810 for $74,268.75, and in 1814 it was granted to Columbia College. So far out in the country was the property that although leased by the college in 1823 to a florist for $125 a year and taxes, the tenant could not make it pay, and he surrendered his five years' lease at the end of two years. Then a seedsman took it in 1826 for $500 a year, but he could not make any money, and gave it up the following year. Up to 1904 Columbia University held this former botanical garden plot intact.

Dr. P. H. Rolfs of the Florida experiment station furnishes the following in regard to the tulip-tree (*Liriodendron tulipifera*) in Florida: "This tree is not known to grow to any large extent in Florida, and I was surprised, therefore, recently to find that the tree was growing and producing logs of sufficient size to warrant their being cut for lumbering purposes, in the region west of Palatka and northeast of Ocala. I believe this is the southernmost region where this species grows to lumbering size."

Mr. Aaron Aaronsohn, director of the Jewish Agricultural Experiment Station in Palestine, lectured on the evening of February 15 at the American Museum of Natural History, on "The Story of the Wild Wheat and Its Practical Development." This "wild wheat," which is believed to be the progenitor of the modern cultivated wheats, is said to cover thousands of acres on the slopes of Mt. Hermon. It flourishes in a region where the rainfall is only five or six inches a year, while cultivated wheats require fourteen inches or more of rain annually. Experiments in hybridizing are being made with the idea of obtaining a variety that shall combine this adaptability to a dry climate with the essential characteristics of the wheats of economic value. Messrs. David C. Fairchild and Walter T. Swingle, of the Bureau of Plant Industry of the U. S. Department of Agriculture, were present and spoke in appreciation of Mr. Aaronsohn's work and

of what it would mean to develop a variety of commercially valuable wheat that would flourish on the arid plains of the western United States. Mr. Aaronsohn added also many interesting details as to other features of the work of the Jewish Agricultural Experiment Station, the funds for the support of which are supplied chiefly by Jewish citizens of the United States.

Of great interest to plant breeders are the remaining Jesup lectures on heredity and sex by Prof. T. H. Morgan, of Columbia. They are held at the American Museum of Natural History, at 77th Street and Central Park West, on Wednesday evenings, as follows: March 5—The Effects of Castration and of Grafting on the Secondary Sexual Characters; March 12—Parthenogenesis and Sex; March 19—Inbreeding and Fertility; March 26—Special Cases of Sex Inheritance.

During the coming summer the University of Minnesota, under the direction of Prof. F. E. Clements, is to conduct a graduate school of ecology at Minnehaha-on-Ruxton, Manitou, Colorado. Others on the staff will be Raymond J. Pool, M.A., assistant director, Edith Clements, Ph.D., instructor in botany, H. L. Shantz, Ph.D., special lecturer. The Alpine Laboratory is situated at 8,500 ft. on the Cog Railway between Manitou and the summit of Pikes Peak. The flora is both rich and varied, and in connection with the remarkable diversity of habitat, found in this rugged mountain region, offers exceptional opportunities for the study of plant response, and the origin of new forms. Among the alpine summits of the continent, Pikes Peak is unique in the series of great formational zones which lie across its face. From the Great Plains grasslands, the series runs from valley woodland at 5,800 ft. to mesa, chaparral, foothill woodland, pine forest, aspen woodland and spruce forest to alpine meadow, rock field and bog at 11,000–14,000 ft. in a distance of 7 miles. From the very nature of the mountains, weathering, erosion and other physiographic factors bring about the almost countless repetition of the same or similar habitats, and produce numbers of primary and secondary successions illustrating a wide range of developmental processes and prin-

ciples. The field of investigation open falls into four general divisions: (1) the use of quantitative methods of studying habitat and plant; (2) the application of ecological methods and principles of forestry, agriculture, and plant pathology; (3) the measured study of individual response to the habitat with especial reference to the origin of species; (4) quadrat study of the development and structure of plant formations. For particulars address Dr. F. E. Clements, University of Minnesota, at Minneapolis.

Dr. John W. Harshberger has been appointed on the staff of the summer school of biological laboratory of the Brooklyn Institute of Arts and Sciences at Cold Spring Harbor, L. I.

Dr. E. Bethel sailed February 26 from New Orleans for a five weeks' collecting trip to Panama, Costa Rica and Guatemala.

The corporation of Harvard University, in the disposition of the Sheldon fund for travelling fellowships, has awarded during the past four years, several grants to further botanical work. Mr. A. J. Eames and Mr. E. W. Sinnott have made studies on Australian types of tree structure and Mr. W. P. Thompson has made studies of Javanese and South African plants. Both of these expeditions were made possible by the Sheldon Fund.

Richard M. Holman, B.A. (Stanford, '07), senior instructor in botany, University of the Philippines, stationed from June, 1910, to June, 1912, at the College of Agriculture, Los Banos, Philippine Islands, is on leave of absence which extends to September, 1913. He is at present engaged in graduate study at Leipzig University.

The botanical department of Columbia University is conducting a *colloquium*, for the reviewing of current literature, which meets the first and third Tuesday evenings of the month, and the Brooklyn Botanic Garden, under the direction of Dr. E. W. Olive is conducting a seminar devoted to Thompson's "Heredity," which meets on alternate Monday afternoons.

Dr. Arthur Hollick of the New York Botanical Garden will spend March, April and May at the U. S. National Museum, continuing his studies of Alaskan fossil plants.

From the Denison (Texas) *Weekly Herald*, we learn of the death on January 21 of Thomas V. Munson, a nurseryman who conducted valuable experiments on the breeding of fruits. Dr. Munson was a member of the American Association for the Advancement of Science, American Breeders' Association, and many other societies.

At the organization of the New York State Forestry Association completed at a convention held at Syracuse on January 16, Dr. N. L. Britton was elected first president of the society.

Dr. Edward A. Burt, professor of natural history (botany) in Middlebury College, Middlebury, Vt., has been appointed librarian and mycologist of the Missouri Botanical Garden, St. Louis, Mo. He will leave Middlebury at the close of the present college year and begin his work at the Missouri Botanical Garden in September.

The New York Botanical Garden has secured the C. F. Cox collection of Darwiniana, perhaps the most complete in this country. The catalog of the collection, as published in the *Journal* of the Garden for January, comprises 236 numbers. It includes first editions of practically all Darwin's works, manuscript notes, presentation copies and many other valuable features.

According to the *Evening Post*, Dr. G. M. Reed, of the University of Missouri, will give three courses in botany at the coming summer school of New York University.

Dr. Theo. Holm has recently examined all the collections being used as a basis for the species of *Dicaeoma* inhabiting *Carex*, as they are to appear in the *North American Flora*. There were altogether 1050 packets. Dr. Holm verified a large number of names where the hosts showed suitable fruiting parts, changed a few names, and supplied 34 new determinations. The manuscript as it now stands recognizes 24 species of *Dicaeoma* (*Puccinia*) on *Carex*, but a number of these species are represented by only a few collections or by a single one. Collections of rusted *Carex* bearing suitable data, and especially when accompanied by mature inflorescence of the host, will be welcomed for this study, and may be sent to Dr. J. C. Arthur, Lafayette, Ind.

The Torrey Botanical Club

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WILLIAM MANSFIELD

* Died February 1, 1913.

Vol. 13 April, 1913 No. 4

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A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

CONTENTS

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Brooklyn, N. Y.

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Vol. 13 No. 4

ECHINOCACTUS WISLIZENI ENGEL. AND ECHINOCACTUS LECONTEI ENGEL.

By R. E. Kunze

In regard to these two species, there is a diversity of opinion as to their position as distinct species. Dr. George Engelmann considered them as distinct from each other. The late Dr. K. Schumann united these species and made one a variety of the other. Dr. Schumann had never observed adult plants of either of them, and could not have known how unlike the spines of each are, when the plants are fully matured. Dr. James W. Toumey,* formerly professor of botany in the University of Arizona, at Tucson, also held that these plants were two distinct species.

I have collected all of my plants of *Echinocactus Wislizeni* in the river bottoms of Rio Gila, Rio Salado and the Agua Fria, which last named stream is confluent with the Rio Gila 18 miles from Phoenix. The Rio Salado empties its waters into the Rio Gila 15 miles from Phoenix. *Echinocactus Wislizeni* is usually found very near to the bottom-lands of these rivers, and on the tableland when this is of a sandy and loamy character, as it is for a few miles beyond. *Echinocactus Lecontei* is generally met with in the foothills of our mountains and when growing on tablelands it prefers the rockiest situations, among boulders of granite or a calcareous formation. Sometimes it is found in very sandy arroyos, or water courses of the tableland, and in such cases the form is that of an obovate plant, while the cylindrical form always occupies the sides of our foothills and mountains. I have collected plants of *Lecontei* of two meters in

* Garden and Forest 8: 154. 1895.

[No. 3, Vol. 13, of Torreya, comprising pp. 45–72, was issued 8 March 1913]

length and weighing 350 pounds, equivalent to 175 kilo. All the mature plants of *Lecontei* have invariably a *curved central spine.*

Echinocactus Wislizeni, of which I have collected specimens two and a quarter meters in length, also average 175 kilo. in weight. But the form is much more obovate or subglobose and therefore of greater diameter, on which account it is called barrel cactus. Cylindrical plants of this species do not exist. Smaller sizes are quite spherical.

The central spine of a mature plane of *Wislizeni* is always very much *hooked*, hence this species is known as the fishhook cactus. The flower of *Lecontei* is yellow, of the shade known as Indian yellow. The flowers of all the many hundreds of *Wislizeni* I have observed during the past dozen years in the vicinity of Phoenix, were always of a rich purple color, and also in all specimens met with in the bottom lands of the Rio Santa Cruz, near Tucson, and the Rio Rillito, near Pantano, Arizona, the flowers were purple. Yet Prof. John M. Coulter, in The Botany of Western Texas, says the flower of *Wislizeni* is *yellow*, and gives locality on the upper Rio Grande, from El Paso upwards. Dr. Bigelow collected *Wislizeni* near the Rio Colorado in Arizona nearly fifty years ago, but made no mention of the flowers.

I am now in a position to settle the difference of opinion in regard to these two species. Mr. E. O. Wooton, for twenty years botanist of the experiment station of the agricultural college, Mesilla Park, New Mexico, visited me on the 29th of July, 1911, for the purpose of studying the many species of my cactus farm. Mr. Wooton had previously paid much attention to the succulents of New Mexico. He therefore was much astonished to see one of my plants of *Wislizeni* with a purple flower, and also noted the difference of the size of spines between my plants and those of New Mexico. Now Mesilla Park is located in Doña Ana County, the type locality of *Wislizeni*, where all flowers of this species are yellow or straw-colored.

Fortunately we found a plant of *Lecontei* in one of the beds with a belated flower having yellow petals, anthers and stamens, all others being withered, and Mr. Wooton remarked that it was

the counterpart of the color of the flower of *Wislizeni* in Doña Ana County. The size of the plants of *Wislizeni* in New Mexico, Mr. Wooton told me, were only half the size of those in my garden, and I happened to have plants on hand from 30 cm. up to 1½ meters in height.

On the 31st of July, I discovered another flower on the same plant of *Wislizeni*, which was tinted a whitish yellow, and it made me think it might be a hybrid. It is a rare occurrence in the vicinity of Phoenix to find a plant of *Wislizeni* among hundreds of *Lecontei*, and *vice versa*. The earlier flowers of this plant had petals of a similar tint, but the one last observed, on July 31, had petals decidedly yellower on both sides. Mr. Wooton advised me to make a new species of *Wislizeni*, which had *purple* flowers. After due consideration, I concluded to determine it as *Echinocactus Wislizeni*, var. **Phoeniceus,** so as to avoid errors in the future regarding these two species.

Where the zone of the occurrence of these two species is of a near approach, it is with difficulty that we can separate young plants, without flowers, one from the other, because the central spine of *Lecontei* is frequently as much hooked as in young specimens of *Wislizeni*.

It is a rare occurrence for a *Wislizeni* to sprout unless the plant has been injured, whereas in *Lecontei*, it is frequently noticed on normal plants. Taken in consideration that *Lecontei* blooms fully six to seven weeks earlier than *Wislizeni*, a fact also observed by Prof. Toumey, why should not these two plants be considered as distinct species, as first suggested by Dr. George Engelmann, in the botany of the Mexican Boundary Report. It cannot be otherwise.

PHOENIX, ARIZONA.

FOSSIL FLOWERS AND FRUITS.—III*

BY T. D. A. COCKERELL

Sambucus Ellisiae sp. nov.

Flower 5.75 mm. in diameter; corolla with five triangular lobes, a fraction over 1 mm. long, their sides nearly straight and their

* Fossil Flowers and Fruits, I. and II., appeared in TORREYA 11: 234 and 12: 32.

apices more or less acutely pointed; anthers about or almost 1 mm. long, alternating with the corolla lobes; filaments apparently connate basally, or at least broadly attached to the corolla.

Found in the miocene shales of Florissant, Colorado, by one of the University of Colorado expeditions. Named after Mrs. Marion Durbin Ellis, who first recognized its generic position. It probably belongs to one of the two species already described from Florissant, based on leaves, but it is given a separate name, owing to the impossibility of referring it definitely to either of those species. It is a very pretty little flower, remarkable for the regular form, with the anthers exactly in place, this being due, no doubt, to the short and broadened filaments. The corolla lobes are more pointed, with straighter sides, than in the modern species known to me.

I take this opportunity to note that Mrs. Cockerell has succeeded in uncovering the basal leaflets in the type specimen of

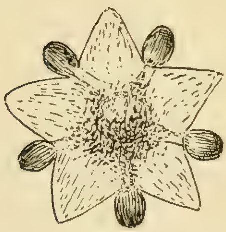

FIG. 1. *Sambucus Ellisiae.*

FIG. 2. *Phalaris (?) geometrorum.*

Sambucus amabilis Ckll., and they prove to be trifoliolate, as is not rarely the case in the modern species. The lateral divisions are narrow, and considerably smaller than the apical one.

Phalaris (?) **geometrorum** sp. nov.

A lemma 19 mm. long, nearly 3½ broad near base; apex narrowly acuminate, but not awned; margin not hispid; median nervure colorless, hardly at all visible; outer nervures (one on each side) thick and dark, reddish-black as preserved, doubtless dark green in life, but pallid apically.

Found by Mr. George N. Rohwer at station No. 14, Miocene shales of Florissant, Colorado. This may not be a *Phalaris*, but it is at least suggestive of that genus. The specific name is a fanciful one, given in allusion to the parallel straight lines.

SHORTER NOTES

THE GENUS MALPIGHIA IN JAMAICA.—Heretofore we have known five species of *Malpighia* from Jamaica, West Indies, together with the apparently trustworthy report of a sixth one, namely *Malpighia incana* Mill. The species positively known to occur on the island, and also recently collected there, are *Malpighia glabra* L., *M. punicifolia* L., *M. fucata* Ker., *M. urens* L., and *M. biflora* Poir. Jamaica is the type locality for both *Malpighia glabra* L. and *M. urens* L. Recently specimens of an additional species have come to hand. It may be described as follows:

Malpighia Harrisii Small, sp. nov. A slender shrub commonly about 3.5 m. tall, with sparingly pubescent twigs: leaves glabrous, at least ultimately so, above the petiole; blades oval, oblong, or ovate, 6–12 cm. long, obtuse to acute, or individually notched at the apex, entire, bright-green above, paler-green beneath, rounded at the base, short (5–8 mm.) -petioled: cymes sessile, many-flowered, the branches sparingly pubescent, at least when young: calyx with 6 glands; sepals oblong or ovate-oblong, about 3 mm. long, obtuse, twice as long as the glands or less: corolla rose-color, about 2.5 cm. wide, the larger petals 12–13 mm. long: androecium with 2 very large filaments: gynoecium with unequal styles, the 2 posterior ones much stouter and longer than the anterior one: drupes not seen.

In Peckham Woods, Upper Clarendon, Jamaica, collected by William Harris, September 27, 1912, *11189*.

This species appears to be most closely related to *Malpighia urens*. It differs from the latter species in the glabrous, larger, broader, and longer-petioled leaf-blades, and in the larger corollas.

J. K. SMALL

A FURTHER NOTE ON THE LINNEAN HERBARIUM. Dr. B. Daydon Jackson writes me (Jan. 2, 1913) that No. "57 *Cocci-*

ferus" is represented in the Linnean Herbarium, in which I failed to find it (Bull. Torr. Bot. Club 39: 201. 1912). In his recent Index to the Linnean Herbarium (Suppl. Proc. Soc. 96. 1912) he records the species *Lichen cocciferus* L. as represented by a type specimen.

R. HEBER HOWE, JR.

THOREAU MUSEUM,
CONCORD, MASS.

A PLANT NEW TO THE STATE OF NEW YORK AND THE LOCAL FLORA RANGE.—It is here worthy of record that Miss F. A. Mulford collected in July, 1903, at Arkville, Delaware Co., N. Y., specimens of the musk-root *Adoxa Moschatellina* L. This is the first record of this plant's occurrence either in New York State or the local flora range. The nearest previous stations for this species are in Arctic America and Iowa. The discovery of this rare plant at an elevation of about 1,400 ft. in the Catskills is a noteworthy addition to the list of local flora plants. Specimens of this plant from Arkville are in the herbarium of the Brooklyn Botanic Garden and in Miss Mulford's herbarium.

NORMAN TAYLOR

AN INVESTIGATION OF "LACINIARIA SCARIOSA."—As already known at several botanical institutions, the writer has been engaged for many years, as time permitted, in the elaboration of the laciniarias of the *scariosa* group. A large amount of material has been assembled at the National Herbarium by acquisition and loan, the writer himself having collected over six hundred specimens. In all, not less than seventeen hundred specimens have been examined. This material represents beyond all controversy an immense number of species and these, upon due comparison, are seen to fall into natural classes.

It will easily be understood that no superficial study based on local and scattering specimens can secure a scientific disposition of these plants, and the disjointed publication of names, the reference of which can only be known by consulting the type material, adds complication to an already sufficiently complicated matter. I therefore bespeak the patience of the botanical public

till I shall be able to complete an exhibition of the group, now far advanced, which will not, indeed, be exhaustive, but will be so thorough as to afford a solid foundation for future work. Additional specimens will be welcome even if they lengthen the task, but increase of material in some cases eases the work rather than adds to it.

EDWARD S. STEELE

WASHINGTON, D. C.

REVIEWS

THREE PUBLICATIONS ON HEREDITY

Genetics*

This volume aims to introduce the average reader to the various problems in the study of heredity. The chapter headings are as follows: I. Introduction; II. The Carriers of the Heritage; III. Variation; IV. Mutation; V. The Inheritance of Acquired Characters; VI. The Pure Line; VII. Segregation and Dominance; VIII. Reversion to Old Types and the Making of New Ones; IX. Blending Inheritance; X. The Determination of Sex; XI. The Application to Man; and XII. Human Conservation.

It is a difficult task to summarize for the ordinary reader the various lines of thought and investigation covered by these topics. Too often a popular treatise on a scientific subject falls into the error of presenting as clear cut facts, results and conclusions not fully established. The general reader is not likely to consider these with a critical mind and too often accepts mere views and partly established facts as fundamental principles. There is, in other words, an air of finality that does not stimulate the best thought in the mind of the reader. This volume on genetics is not entirely free from this defect. In general, however, the author has made clear statements of the problems under consideration, of the evidence at hand bearing on them, and of the field for future investigation. In the chapters on Variation, Mutation, Inheritance of Acquired Characters, The Pure Line and Human Conservation, the author is at his best, at least in this respect.

* By Herbert Eugene Walter, assistant professor of biology at Brown University. Pages i-xiv + 1–272. [Illust.] Published February, 1913, by The Macmillan Company. Price $1.50 net.

In discussing Segregation and Dominance, Old Types and New, and Blending Inheritance, the author is fully committed to the Mendelian interpretation. Characters are treated as independent units which "segregate out as if independent of each other," and the factor hypothesis is given for its full assumed value in the explanation of heredity. The assumption of an increased number of "duplicate determiners" which explain all phenomena of blending inheritance is given as "strictly cases of Mendelian dominance and segregation."

It would seem that even a popular book of this sort should present the facts concerning incomplete segregation, the evidence for the modification of the so-called unit-characters by selection and the various difficulties and inadequacies of the Mendelian notation. Aside from this, the selection of experimental data is well made and is representative of the lines of the experimental research of the past decade.

There is at present no other book that attempts to cover in a semi-popular way so much that pertains to heredity. The volume is an introduction to the study of heredity presented from what may be called the Mendelian viewpoint.

A. B. Stout

"Heredity of a Maize Variation" is the title of Bulletin No. 272 written by G. N. Collins and issued in January by the Bureau of Plant Industry of the United States Department of Agriculture.

This paper reports the appearance of a single white ear of maize as an "albinistic mutation" in a strain of pure yellow corn and gives an account of various studies on the heredity of this ear. Three xenia generations were secured by self fertilization, and crosses between certain of these and two types of white corn are reported. In all of these the endosperm characters were studied and the results tabulated and expressed in ratios.

The results viewed in a general way give a fair agreement with the ratios of Mendelian expectation, but upon more careful analysis the author finds that in certain cases either a monohybrid or a dihybrid ratio might apply, depending on the grade of classification.

The pure bred progenies of this albino ear gave seeds that were dark yellow, light yellow, very light yellow, and white. Most of the seeds showed at least some trace of yellow, and apparently pure white seeds, from an ear bearing these classes, produced under further self fertilization, seeds with the yellow endosperm fully developed. The author points out that the segregation is incomplete, that the dominant character is not absent from certain of the recessives and that the "results appear as evidence against the idea of gametic purity and alternative inheritance."

A. B. Stout

Recent Reports on the "Qualitative Studies of Inheritance in *Nicotiana* Hybrids"* by Dr. T. H. Goodspeed are especially interesting on account of the results obtained and the interpretation which is given to them.

One phase of the investigation pertains to the relation between the weight of hybrid tobacco seed and the inheritance of characters in the F_2 generation, the cross being between two varieties of *Nicotiana Tabacum*, which have among other contrasting characters differences in the weight of the seed. The seed produced by the F_1 generation was separated into various grades according to weight by an improved "grader." On the basis of weight twenty-two grades were made, ranging in weight per hundred seeds from 0.0041 to 0.0111 grams.

The data show a marked correlation of heavy seed with the vegetative characters of the original parent having the heavier seed, and of light seed with the characters of the other parent. In other words the fluctuations in the weight of the seed produced by the F_1 generation are correlated with certain fluctuations in the vegetative characters of the F_2 generation. The heavy seed germinated more quickly and gave seedlings that were at the start more vigorous, but as the season advanced a larger percentage of plants matured from the seedlings derived from the light and medium weight seed. It is pointed out that these studies indicate that in investigating the heredity of plants greater attention should be paid to the physical characteristics

* University of California Publications in Botany, Vol. 5, Nos. 2 and 3.

of the seed, that if possible all types and grades of seed should be germinated, and that seedlings showing all degrees of vigor should be grown to maturity, since variation in seed size, etc., is a direct suggestion of the possible segregation of the original characters.

A second part of the report treats of the "quantitative expression of imperfect dominance in the corolla diameters of the flowers on the hybrids produced from three varieties of *Nicotiana acuminata*." These three varieties differ only in regard to the diameter of the open corolla, a feature which is practically constant for each variety giving an average for the varieties of 13 mm., 20 mm. and 27 mm. with fluctuations never greater than 2 mm. more or less than the mean for any one variety.

Measurements were made of the corollas on five groups of hybrids between these varieties. In every group the average of the measurements was intermediate between the average corolla diameters of the respective parents. The fluctuations, however, in the F_1 plants of all the hybrid groups taken together was from 13 mm. to 30 mm. or as great as the extremes exhibited by the parents. The fluctuation, however, within a single group was almost twice as great as the greatest fluctuation in any of the parental varieties.

In a later paper Dr. Goodspeed gives a preliminary report on the F_2 hybrids of these same forms grown during the summer of 1912. In these still greater fluctuation appeared. For example, of the F_2 plants of the cross "III ♀ × II ♂" (small flowered variety × variety with corollas of intermediate size) every one bore "flowers smaller than the smallest ever measured on the small-flowered parental variety III, and every plant also bears flowers larger, with possibly one exception, than the largest flowers measured, on variety II in 1900 and 1911." The data thus exhibit cases of hybridization which produce in the F_1 and F_2 generation greater degree of fluctuation than was seen in the parents.

The author states that "a sample monohybrid ratio was anticipated for the results of the measurements of corolla diameter of flowers on F_2 individuals," but that the results do not admit of any handy or helpful interpretation by the Mendelian notation.

The author discusses the "present status of the unit character conception" in a fashion both suggestive and stimulating. It is pointed out that, on the multiple factor hypothesis, the assumption of complexity in the germ plasm can be extended so as to interpret in Mendelian formulae any degree of variation, but the question whether the "end justifies such means" is raised.

The results of this investigation and the discussion which is given are pertinent to the present situation. It is emphasized that there are hereditary phenomena that do not lend themselves to a Mendelian notation in any way that is helpful from a practical point of view or even theoretically illuminating. It is an indication of the growing reaction against the extremely speculative character which the Mendelian notation has been given in the "presence and absence" and "multiple factor" hypotheses.

Meanwhile we must await a more intensive analysis of characters which are now considered qualitative as well as those which are clearly quantitative. The great service which Mendel contributed to the study of genetics in focusing attention on single characters, may through such studies reach fruition.

A. B. Stout

PROCEEDINGS OF THE CLUB

January 14, 1913

The annual meeting of the Club for 1913 was held at the American Museum of Natural History at 8:15 P.M. President Burgess presided. Twenty-five members were present.

The minutes of December 10 weie read by Dr. A. Hollick and were approved as read.

J. K. Henry, 2024 Beach Ave., Vancouver, B. C., and F. W. Pennell, Wawa, Pa., were proposed for membership in the Club.

The reports of the various officers were then presented. The treasurer's report was referred to an auditing committee consisting of Dr. J. H. Barnhart and Prof. R. A. Harper, appointed by the president.

The secretary reported that fourteen meetings had been held during the year, with a total attendance of 271 and an average

attendance of 20. Thirteen persons have been elected to membership and thirteen resignations have been read and accepted. One death has occurred. Six lectures illustrated with lantern slides were delivered, at which the combined attendance was 139.

The editor reported that Volume 39 of the *Bulletin* contains 631 pages, 29 text figures and 45 plates and the total expense amounted to a little less than $1,230. Six plates and one text figure were presented by Miss Broadhurst and eight plates were furnished by Miss Robinson. Parts 1 and 9 of Volume 7 have been reprinted as authorized. The editor's complete report was appended. In conclusion the editor extended his grateful acknowledgment to his associates on the editorial board and wished to thank Dr. M. A. Howe in particular for reading proof and his kindly coöperation. He further presented his resignation, which was accepted, and the secretary was directed to convey a vote of thanks of the Club to Dr. Dowell for his very efficient services for the past two years.

The editor of TORREYA presented a special report relating to the affairs of the publication of TORREYA.

On motion of Prof. R. A. Harper the president appointed the treasurer a committee of one to report the names of all persons and institutions on the mailing list of the Club's publications who were not actual subscribers or were not receiving authorized complimentary or exchange copies.

Formal reports of the finance committee and the program committee were not presented.

Dr. N. L. Britton, chairman of the committee on local flora, not being present, Dr. M. A. Howe, representing him, brought up the matter of publishing Mr. Taylor's work on the local flora. On motion of Prof. Harper the matter was referred to the board of editors with the request that a report be rendered within three months. Mr. Taylor reported that his work was about two thirds complete and that it would be ready for publication at an early date.

Mr. Sereno Stetson, chairman of the field committee, reported that twenty-five Saturday excursions had been conducted with an attendance of 110 people. His report was accepted.

Dr. W. Mansfield, delegate to the council of the Academy of Sciences, reported that the meetings of the council during the year had been of unusual interest. Miss Jean Broadhurst had been allowed a grant of $200 from the Esther Herrman Fund.

The report of the committee on honorary members not being ready the chair requested the vice-president to call a meeting of the committee at an early date.

On motion of Dr. C. S. Gager the secretary was directed to convey the vote of thanks of the Club to the American Museum of Natural History for the use of the building during the year and for the many courtesies extended the Club.

The following officers were elected: *President*, Edward S. Burgess; *Vice-Presidents*, John Hendley Barnhart and Herbert Maule Richards; *Secretary and Treasurer*, Bernard O. Dodge; *Editor*, E. L. Morris; *Associate Editors*, Jean Broadhurst, Ernest Dunbar Clark, Alexander William Evans, Marshall Avery Howe, Herbert Maule Richards, Arlow Burdette Stout, Norman Taylor.

Dr. W. Mansfield was elected delegate to the council of the New York Academy of Sciences.

Meeting adjourned.

B. O. Dodge,
Secretary

January 29, 1913

The meeting of January 29, 1913, was held in the laboratory of the New York Botanical Garden at 3:30 P.M. Dr. Marshall A. Howe presided. Twenty persons were present. The minutes of January 14 were read and approved.

Resignations from the following members were read and accepted: Gladys Pomeroy, Alice L. M. Wheeler, Alice R. Northrop, Mary F. Barrett, W. D. Hoyt, Elizabeth H. Kellogg.

The following committee appointments for 1913 were announced in a communication from President Burgess.

Finance Committee.—J. I. Kane,* Robert A. Harper.

Budget Committee.—J. H. Barnhart, N. L. Britton, B. O. Dodge, E. L. Morris, M. A. Howe, H. H. Rusby.

Field Committee.—Sereno Stetson, with power to name his associates.

* Died February 1, 1913.

Program Committee.—Mrs. E. G. Britton, Jean Broadhurst, C. Stuart Gager, F. J. Seaver.

Local Flora Committee.—N. L. Britton, Chairman.

Phanerogams.—E. P. Bicknell, N. L. Britton, C. C. Curtis, K. K. Mackenzie, E. L. Morris, N. Taylor.

Cryptogams.—Mrs. E. G. Britton, Philip Dowell, Tracy E. Hazen, M. A. Howe, W. A. Murrill.

The first number on the scientific program consisted of a paper by Dr. H. A. Gleason. Dr. Gleason stated that the present distribution of plants in the Middle West, from Ohio to Iowa, can not be accounted for satisfactorily by any modern environmental conditions. It is to be regarded as the culmination of a series of movements, begun at the close of the last glacial period, and continued until the recent advent of civilization. Three types of vegetation have taken part in these migrations: the coniferous forest, the eastern deciduous forest, and the western prairie. The movement of the coniferous forest has been simply northward and it has now left the region almost completely. Of the other two, four periods of migration may be recognized: (1) A period of dry climate accompanied by the extension of prairies far eastward. (2) A period with more favorable climate accompanied by the restriction of the prairie and the migration of the forest westward. During this period forests occupied a large proportion of the land in Illinois and Iowa, but probably did not extend so far west in Kansas and Nebraska as at present. (3) A period of prairie fires, following the advent of the Indians, during which the forest was driven back to the position which it occupied a century ago. (4) The last century, during which, with the cessation of prairie fires the forests commenced an extraordinarily rapid advance upon the prairie.

The second announced paper was presented by Dr. C. C. Trowbridge, of the department of physics of Columbia University. Dr. Trowbridge's paper on "Branch Movements of Certain Trees in Freezing Temperatures" will be published in the *Bulletin* of the Club. A brief summary of the results obtained in a series of measurements made during last winter and the present one is as follows:

(1) That branch movements occur in certain trees, due to temperature changes below the freezing point of water, and that in certain other trees no movement whatever has been observed. (2) That the movements amount to as much as 3 or 4 ft. differences in the distance from the ground to the ends of certain curved branches which are in length of the order of 20 ft., these changes occurring through a range of 30 degrees below freezing. (3) That little, if any, movement takes place above freezing point of water, and that the movements begin soon after the temperature remains at this point for several hours. (4) That there is a considerable lag in the movement of the branches behind the temperature changes, although a difference in the rate of change of temperature is followed at once by a difference in the rate of change of the position of the branches. (5) That the movements are practically of equal magnitude in December, January and February, that is, the seasonal change is not a ruling factor in this movement.

Meeting adjourned.

B. O. Dodge,
Secretary

NEWS ITEMS

From the Pasadena *Star* we learn of the return to civilization of Paul E. Popenoe after a nine months' expedition to the region near the head of the Persian Gulf, in search of different strains of the date palm. He is now en route to California with 14,000 date palms. These plants are expected to yield valuable information in regard to the availability of the date in California. They will supplement the collections of Dr. David Fairchild, of the Bureau of Plant Industry, from the same part of Arabia and Persia.

Dr. Edward W. Berry, associate in paleobotany at the Johns Hopkins University, has been elected a member of the Geological Society of France.

On March 25, 1914, Professor A. Engler, of the Royal University of Berlin and director of the Royal Botanical Garden and Museum at Berlin, will celebrate his seventieth birthday. A

marble bust will be made by the sculptor B. Mauthein Schmargendorf. Contributions for this bust are solicited from American botanists and may be sent Für die Engler-Büste, care of Deutsche Bank, Depositenkasse L, Berlin N. 4, or to Dr. L. Wittmack, Berlin, N. W. 40.

President Wilson has appointed Beverly T. Galloway as assistant secretary of agriculture and the senate has confirmed the appointment. The selection of Dr. Galloway, for more than twenty years associated with the Department of Agriculture, and since 1900 the active head of the Bureau of Plant Industry, is in every way an appointment that must bring general satisfaction to the scientific men of the country. Dr. William A. Taylor has been appointed chief of the Bureau of Plant Industry to succeed Dr. Galloway.

Mr. E. L. Morris has gone to Arizona to study types of desert vegetation, especially with a view to the making of museum models for a comprehensive group to be installed in the Brooklyn Institute Museum.

The Brooklyn Botanic Garden has purchased the herbarium of the late Henry Dautun, of Jersey City, who was a member of the Torrey Club. The collection comprises about thirty thousand specimens, mostly from Europe and the United States.

A preliminary announcement has been published of an excursion of European and American plant geographers, during August and September. The party will leave Chicago about August 1 and after touring over most of the United States, will arrive in New York about September 25. A more comprehensive announcement will be issued in the near future.

The University of Colorado mountain laboratory is to have a six weeks' session during the coming summer at Tolland, Colorado. Courses in botany and zoölogy are offered and particulars may be obtained from Dr. F. Ramaly, Boulder, Colorado.

The Torrey Botanical Club

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their papers appear, will kindly notify the editor when submitting manuscript.

Reprints should be ordered, when galley proof is returned to the editor. The New Era Printing Co., 41 North Queen Street, Lancaster, Pa., have furnished the following rates:

	2pp	4pp	8pp	12pp	16pp	20pp
25 copies	$ .75	$1.05	$1.30	$1.80	$2.20	$2.50
50 copies	.90	1.20	1.70	2.20	2.50	2.85
100 copies	1.15	1.55	1.95	2.55	2.90	3.20
200 copies	1.70	2.35	2.90	3.75	4.35	4.70

Covers: 25 for 75 cents, additional covers 1 cent each.

Plates for reprints, 40 cents each per 100.

The following Committees have been appointed for 1913

Finance Committee

J. I. KANE, *Chairman**
ROBERT A. HARPER

Field Committee

SERENO STETSON, *Chairman*

Budget Committee

J. H. BARNHART, *Chairman*
N. L. BRITTON
B. O. DODGE
M. A. HOWE
E. L. MORRIS
H. H. RUSBY

Program Committee

MRS. E. G. BRITTON, *Chairman*
MISS JEAN BROADHURST
C. STUART GAGER
F. J. SEAVER

Local Flora Committee

N. L. BRITTON, *Chairman*

Phanerogams:
E. P. BICKNELL
N. L. BRITTON
C. C. CURTIS
K. K. MACKENZIE
E. L. MORRIS
NORMAN TAYLOR

Cryptogams:
MRS. E. G. BRITTON
PHILIP DOWELL
TRACY E. HAZEN
M. A. HOWE
W. A. MURRILL

Delegate to the Council of the New York Academy of Sciences,
WILLIAM MANSFIELD

* Died February 1, 1913.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

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(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 39 published in 1912, contained 630 pages of text and 45 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are, agents for England.

Of former volumes, only 24–37 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–39 three dollars each.

Single copies (30 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The Memoirs, established 1889, are published at irregular intervals. Volumes 1–13 are now completed; Nos. 1 and 2 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

DR. BERNARD O. DODGE
Columbia University
New York City

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CONTENTS

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THE VEGETATION OF CONNECTICUT

I. Phytogeographical Aspects

By George E. Nichols

From a taxonomic standpoint the flora of Connecticut is adequately summed up in the several more or less comprehensive bulletins which have been published by the Connecticut Geological and Natural History Survey,[1] but except for a few casual references which have appeared incidental to these and other papers no attempt has yet been made to portray the ecological relations. With the intent of supplying in a measure this deficiency the writer has undertaken a study of the vegetation of the state from an ecological point of view, the results of which are to be presented in this and subsequent papers. Although much of the work has necessarily been in the nature of a reconnaissance, and while many of the observations set forth will already be familiar to some of the readers, it is felt, nevertheless, that some such preliminary survey of the field in question is essential as a basis for future research. In this first paper attention is directed principally to those larger and more general aspects of plant distribution which seem of phytogeographical interest. The discussion of plant societies, successional relations, and other problems of a more distinctly local nature is deferred until later.

[1] Evans & Nichols, The bryophytes of Connecticut, Bull. 11, 1908; Graves, Eames, Bissell, Andrews, Harger, & Weatherby, Catalogue of the flowering plants and ferns of Connecticut, Bull. 14, 1910. Bulletins 3, 5, 10, and 15 deal with algae and fungi.

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By way of introduction the status of the flora from a qualitative viewpoint may be briefly summarized. Exclusive of the thallophytes, 1,949 indigenous species of plants have been recorded from Connecticut. Of these the bryophytes include 463 (liverworts 134, mosses 329), the pteridophytes 74, and the spermatophytes 1,412 (gymnosperms 13, monocotyledons 496, dicotyledons 903). Besides the native element there is a large and constantly increasing number of spermatophytes which have been variously introduced and which in many cases have become thoroughly established. Upward of 460 such aliens are now known, but while qualitatively and even quantitatively abundant, they may largely be disregarded in the present discussion, since they serve to complicate rather than simplify matters. Nearly 70 per cent of the indigenous plants are endemic to North America, the remaining 30 per cent being in large part common to Europe or Asia or both. It is instructive to note, however, how vastly the relative proportions of endemic and extra-continental species vary among and within the great divisions and subdivisions of the plant kingdom. For while less than 20 per cent of the local bryophytes are endemic, and of the pteridophytes hardly 50 per cent, fully 92 per cent of the gymnosperms (*Juniperus communis* seems to be the sole exception), 80 per cent of the monocotyledons, and nearly 90 per cent of the dicotyledons are not known to occur outside of this continent. Furthermore, among the pteridophytes, for example, only 30 per cent of the homosporous species but nearly 80 per cent of the heterosporous species are endemic; and similarly among the dicotyledons, to select specific cases, it would seem that while nearly 30 per cent of the 37 local Ranunculaceae are extra-continental in range, all but about 2 per cent of the more than 160 Compositae are endemic. The general assertion may be made that in the more primitive groups of plants the species tend to have a wider range than in the more advanced groups; or, to use a different phraseology, that species in groups of comparatively recent evolutionary derivation are far more restricted in range than species in groups of more ancient origin. An examination of the intra-continental ranges of the various species which comprise

the local flora also brings to light certain suggestive distributional peculiarities. It is found that while the majority of the species which are known to occur in Eurasia, range far to the north on this continent, the endemic species exhibit decidedly southward tendencies. For example, of the 28 endemic Ranunculaceae native to Connecticut, only 5—about 18 per cent—have been recorded north of New England or Nova Scotia, while at least 5—in this case more than 50 per cent—of the 9 extra-continental species have a more or less boreal distribution. Similarly, among the bryophytes 84 per cent of the endemic species are apparently confined to latitudes south of northern New England.

In themselves statistics like these may be interesting, but it is only as they offer some intimation regarding the history and relationships of the flora that they become of any great value. In common with other glaciated regions the modern era of plant life in Connecticut dates back to the period when the continental glaciers receded toward the pole. In order, however, to clearly apprehend not only the origin of the native flora but also its affinities to that of other regions one must journey back to preglacial times. For an extended period during the lower Tertiary there must have existed greater or less continuity between the continental land masses of the northern hemisphere, and during at least a portion of that time the climate in the present subarctic regions must have been sufficiently mild to permit the circumpolar migration of temperate plants. In this and no other manner can the undeniable similarity of certain components, notably the bryophytes, in the vegetation of Europe and North America be accounted for. But with the advent of the climatic changes which caused or accompanied the development of the continental ice sheet great transformations in the vegetation were induced. As the glaciers advanced southward the temperate plants, unable to withstand the more rigorous atmospheric conditions, slowly retreated, their places being seized progressively by arctic species which during the warmer period of the early Tertiary had apparently been confined to extreme polar regions. The southward margin of the continental ice sheet in the eastern United States is marked by the terminal

moraine which now forms a part of the "backbone" of Long Island, reaching thence westward through Staten Island and northern New Jersey. The entire state of Connecticut was buried beneath an immense accumulation of ice and snow and its vegetation completely annihilated.

As shown by the terminal moraines on Long Island there were at least two distinct glacial epochs in this region. It was during the first of these, when practically the entire northern half of the island was ice-bound, that the southernmost (Ronkokoma) moraine was formed and the broad outwash-plain which today obscures most of the Cretaceous substructure of the southern half of the island was largely developed. At the time of maximum glaciation, when the building up process must have been most actively progressing, it is doubtful whether vegetation could have maintained any appreciable foothold on the shifting surface of southern Long Island. But with the stability that ensued upon the temporary withdrawal of the ice the soil doubtless became populated rapidly by plants which pressed in from the unglaciated regions farther south and, although it is impossible to determine accurately just what conditions obtained in the period which intervened between the temporary retreat and the subsequent reencroachment of the ice sheet, it seems not unlikely that the vegetation came to assume much the same aspect that it exhibits today. If so, upon the readvancement of the ice temperate plants were once more superseded by arctic forms and it may safely be assumed that in the southern part of the island these persisted throughout the reign of cold that followed. With this latter hypothesis in mind one can picture, in the imagination, the floristic aspect of Long Island during this last period of glaciation. The northern edge of the island is buried under a vast sea of ice which stretches monotonously poleward. Between the glacier's margin and the old Ronkokoma moraine to the south there is scant opportunity for plant life to become established on account of the instability of the rapidly upbuilding outwash-plain. But south of the Ronkokoma moraine the surface of the plain is clothed with a low, dense carpet of vegetation similar to that found in the Alaskan tundra of

today. Owing to the fact that even during the summer it never thaws to any depth the ground is wet and boggy. Sphagnums, Cladionas, and Polytrichums abound, while here and there are seen scattered clumps of shrubs—*Chamaedaphne*, *Andromeda*, *Ledum*, *Betula pumila*, *Myrica Gale*, *Alnus incana*, and the like—interspersed with such forms as *Vaccinium Oxycoccus*, *Potentilla palustris*, *Chiogenes*, *Drosera*, *Menyanthes*, *Scheuchzeria*, *Eriophorum*, *Cyperus*, and other sedges. Upon the higher levels, and perhaps upon the moraine itself, there may be groups of trees—firs, spruces, and tamaracks—but nowhere is there the faintest resemblance to the present day vegetation of the Long Island uplands. Such a picture is admittedly fanciful, but to the mind of the writer it approximates the actual conditions which must have prevailed at that time.

The final withdrawal of the glaciers from this region left the topography of Long Island and Connecticut in much the condition that now exists. As the ice front retreated northward there doubtless followed immediately in its wake, wherever soil conditions were suitable, such a tundra formation as the one depicted above, with the advance guard of the coniferous forest, which was destined to occupy temporarily the freshly exposed land areas, but with a few miles in the rear. With the gradual reëstablishment of a milder climate and the contemporaneous thawing and drainage of the ground, which proved fatal to the tundra vegetation, the environment once more became suitable for a temperate flora, and an invasion of plants from the south was inaugurated. In the struggle for the possession of the new territory which must have ensued when these southern invaders began their march northward the boreal element for a time doubtless maintained its own. But partly as a result of decreased vitality under the changed climatic and soil conditions the arctic flora was unable to cope successfully with the more vigorous and adaptable temperate vegetation, so that eventually it was in large part either exterminated or forced northward, with the exception of a relatively small number of forms which had taken refuge, figuratively speaking, in bogs where their descendants still survive.

In the light of these observations it clearly follows that while practically all of the species which at present comprise the flora of this state have been derived directly from the south, nevertheless many of them—certainly those which today are common to Europe—must have existed in preglacial times not only here but far to the north. Of the forms which are now endemic to North America many, like the tulip tree, sweet gum, and sassafras, are known to have been native to Europe in preglacial time, their extinction there being accounted for by assuming that they were trapped, as it were, between the advancing glaciers toward the north and insurmountable east-west mountain ranges toward the south and thus wiped out of existence. But it is equally certain that a large share of these endemic species have never occurred in Europe, and for such species there are two alternative possibilities: either they must have attained their present evolutionary development since the discontinuance of the circumpolar land bridge, or else they must have been restricted until within comparatively recent times to the warmer parts of this continent, so that the opportunity to migrate into Europe has never been afforded them.

The present distribution of the vegetation within the state is the effect of a complex of causes, some of which have long since ceased to operate while others are still active. To a large extent coeval factors of topography, soil, and climate seem ample to explain the observed relations. But there is one problem of plant distribution for which coexistent forces fail to offer any satisfactory solution. This problem relates to the segregation in the southeastern part of Connecticut of a remarkable group of plants which are characteristic of the Atlantic coastal plain region from Long Island and New Jersey southward.[1] The majority of the species involved also range eastward into Rhode Island and southeastern Massachusetts, some of them following

[1] In order, however, to avoid any misapprehension it should be remarked that very many coastal plain plants are more or less widely distributed through the state. A comparison, for example, of the Connecticut catalogue of ferns and flowering plants with Stone's Plants of southern New Jersey (Ann. Rept. N. Jersey State Mus., 1910) shows that nearly 75 per cent of the 540 species listed as characteristic of the New Jersey coastal plain are also found in this state.

the coast northward into the southern parts of Maine and New Hampshire, and a few reaching as far north as Nova Scotia, New Brunswick, and even Newfoundland. The following list comprises coastal plain species which in this state have been found only east of the Connecticut River.[1]

*Sphagnum macrophyllum**†
*Sagittaria longirostra**
Sagittaria Engelmanniana
*Paspalum psammophilum**†
Paspalum circulare†
*Panicum virgatum cubense**†
*Panicum spretum**†
*Panicum oricola**†
Panicum auburne
*Eleocharis Torreyana**
*Carex albolutescens**†
*Carex nigro-marginata**†
Carex ptychocarpa
*Carex bullata**
*Juncus effusus conglomeratus**
*Desmodium sessilifolium**
*Hypericum adpressum**†
*Myriophyllum scabratum**†
*Schwalbea americana**
*Aster spectabilis**†

In the same category should be included two other groups of coastal plain plants. The first is made up of species whose distributional area in the state obviously centers in the southeast but which may extend for some distance westward along the coast or northwestward into the valley of the Connecticut River. Worthy of mention among such forms are:

*Calypogeia Sullivantii**†
*Panicum Commonsianum**†
*Panicum Addisonii**
*Eleocharis tuberculosa**
*Scleria pauciflora**
*Juncus militaris**†
*Xyris Smalliana**†[1]
*Lachnanthes tinctoria**†
*Ilex opaca**†
*Ilex glabra**†
*Ludvigia sphaerocarpa**†[2]
*Sabatia dodecandra**†
*Asclepias variegata**†
*Scutellaria integrifolia**†
*Plantago elongata**†
*Eupatorium aromaticum**†
*Gnaphalium purpureum**†

[1] In this and the two succeeding lists the asterisk (*) and dagger (†) indicate that a species is recorded from the New Jersey coastal plain and Long Island respectively.

[2] In Connecticut known only from West Pond, Guilford, but also found in eastern Massachusetts.

The other group embraces plants which occur locally in other parts of the state but which for the most part are frequent or common in the southeastern section. Representative of this assemblage are:

*Chamaecyparis thyoides**†
*Rynchospora macrostachya**†
*Aletris farinosa**†
*Leucothoë racemosa**†
*Gaylussacia frondosa**†
*Rhododendron maximum**†
*Arctostaphylos Uva-ursi**†[1]
*Nymphoides lacunosum**†
*Lycopus sessilifolius**†
*Utricularia inflata**†
*Utricularia purpurea**†

It is hardly necessary to consider individually the distribution of the various species mentioned above. As the only arborescent form referred to, *Chamaecyparis thyoides*—the coast white cedar—may be selected as fairly typifying in its range the whole group. This tree, in common with all of the plants mentioned, except *Arctostaphylos*, is endemic to North America. South of New England it ranges from Mississippi northward into Long Island being practically confined to the coastal plain. Thence it extends through Connecticut, Rhode Island, and eastern Massachusetts as far north as southern New Hamsphire, and it is also reported as "doubtfully indigenous in Nova Scotia."[2] The coast white cedar usually grows in swamps where it forms colonies of wonderful density, averaging a greater number of trees per acre than any other native species (Fig. I.) Such "cedar swamps" are of frequent occurrence in southern New Jersey and in parts of Long Island and southern New England, sometimes covering more than a thousand acres. In eastern Connecticut, as farther south, the great laurel (*Rhododendron maximum*) often forms a luxuriant, almost impenetrable tangle of undergrowth. In connection with the present problem the writer has gone to considerable effort in an attempt to secure as exact information as possible regarding the distribution of these cedar swamps, past or present, in Con-

[1] Not a southern species but one of the most characteristic plants of the New Jersey pine-barrens. In southeastern Connecticut, as in New Jersey, it often forms a veritable carpet over the sandy soil.

[2] Gray's Manual, ed. 7, p. 66.

necticut and southern New York, and the results of the investigation are graphically shown on the accompanying map (fig. 2). It will be seen that there is an almost continuous chain of them extending the length of Long Island, and it is anticipated that further exploration may supply the missing links in the series.

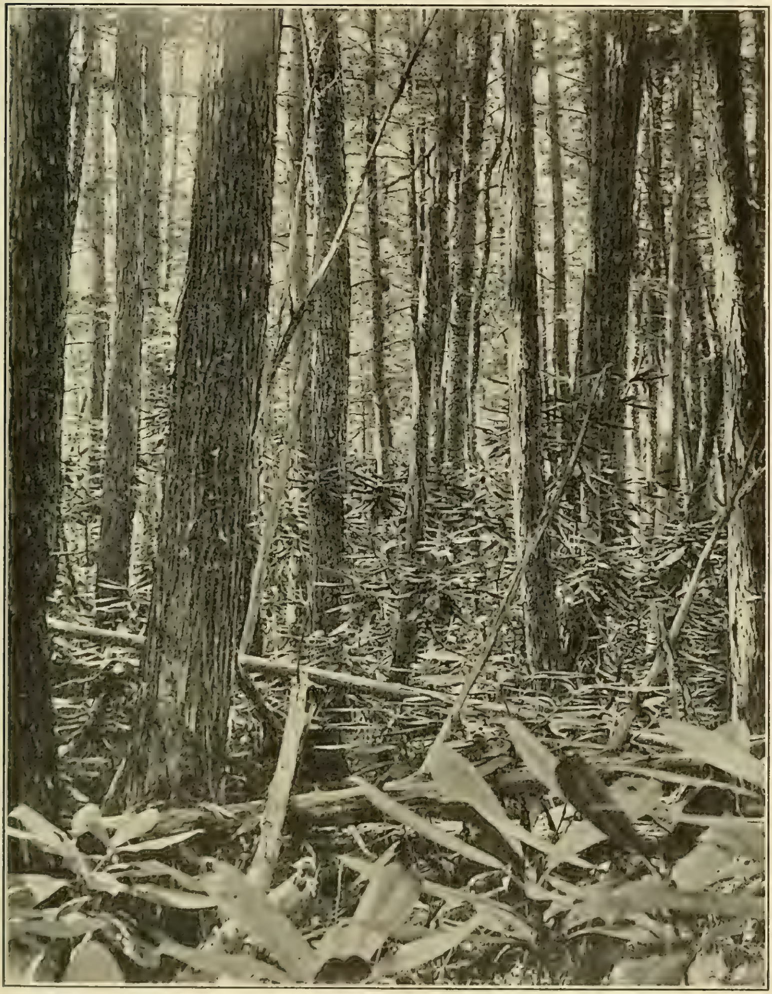

FIG. 1. Interior of cedar swamp at Ledyard. *Chamaecyparis thyoides* and *Rhododendron maximum*.

Doubtless there were formerly cedars in the swamps of Staten Island, but these apparently have long since been obliterated. The cedar has also been found on Plum Island—one of the hiatus-like islands which are intercalated between the eastern end of Long Island and the mainland, while in Connecticut their abundance in the eastern and scarcity in the western part of the state is obvious.

The problem as to the origin or cause of this unique flora in southeastern Connecticut and eastward is one of unusual interest. So far as known there are no pronounced climatic dissimilarities to which it can be attributed, neither is there at present any evidence of topographic or soil conditions sufficiently diverse from those in other parts of the state to afford an adequate explanation. The most satisfactory solution seems to rest on the assumption that in post-glacial time there has been a land bridge which connected eastern Long Island with the adjacent mainland and across which northbound coastal plants could readily pass without entering western Connecticut. The probability that such a formation once existed was urged by Hollick in 1893[1] as an explanation for the occurrence of certain coastal plain plants in Rhode Island and southeastern Massachusetts, and Fernald has recently[2] brought forward convincing botanical evidence in the light of which it seems not improbable that for some time after the recession of the glaciers a more or less continuous land connection stretched northward as far as Newfoundland. In view of the extended discussion of this hypothesis in these papers no further comment is called for here. It must be admitted, however, that the isolation in southeastern Connecticut of such an appreciable colony of coastal plain plants, 75 per cent of which are common both to Long Island and New Jersey, affords strong confirmation of the views advanced by Hollick and Fernald. It is especially difficult to conceive how the coast white cedar could have migrated eastward through southwestern

[1] Plant distribution as a factor in the interpretation of geological phenomena, with special reference to Long Island and vicinity, Trans. N. Y. Acad. Sci., **12**: 189–202. 1893.

[2] A botanical expedition to Newfoundland and Labrador, Rhodora **13**: 109–162. 1911.

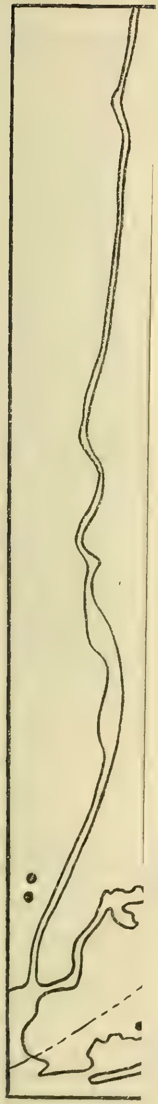

FIG. 2. Ma]
and Lowland in
on Long Island.

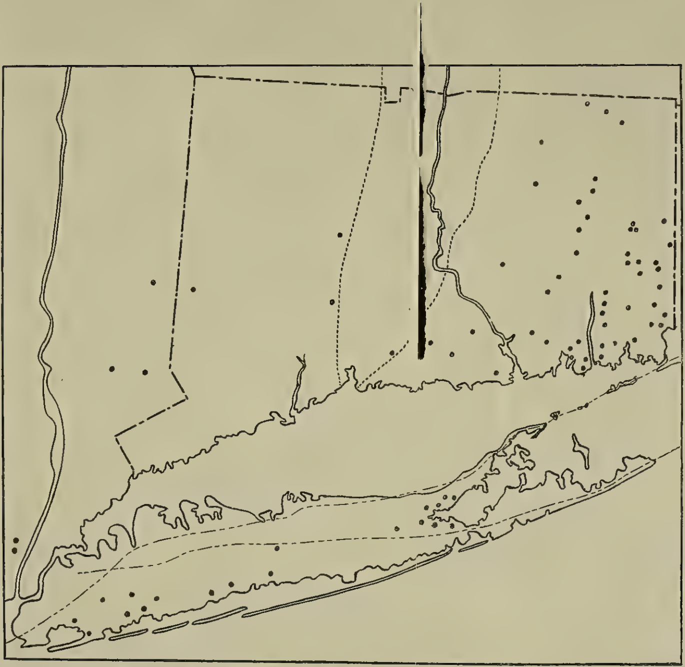

FIG. 2. Map of Connecticut and part of southern New York, showing location of cedar swamps (●), boundaries between Highlands and Lowland in Connecticut (-------), and position of Ronkokoma (—--—--—) and Harbor Hill (—---—---—) terminal moraines on Long Island.

Connecticut and then have vanished so completely from this region, leaving no evidence whatever of its passage—and this in spite of the frequency here of swamps in which edaphic conditions seem identical with those in swamps farther east where cedar abounds.

The possible relationship between cedar swamps and spruce bogs is also of interest. Swamps of the latter type, characterized in part by their relict northern flora, are widely scattered over the northern three quarters of the state, but with the exception of one small area where there are seven within the radius of a mile, are nowhere common. In the western half of the state there are upwards of twenty spruce bogs, while in eastern Connecticut only five are recorded—two of these within a few miles of the Connecticut River. The reason for their relative rarity eastward is suggested by conditions observed by the writer in two small swamps near Plainfield. Here the dominant trees are cedars, but interspersed among these are numerous straggling spruces. In a cedar bog at Bethany there are also said to be a few spruces, although the writer has been unable to locate them. It seems probable, therefore, that within comparatively recent geological times the spruce occupied many of the sites in eastern Connecticut which are now inhabited by the cedar; for, except in the northwestern highland, the spruce in this region seldom grows to a height of more than six meters and as a rule the trees form a very open stand, so that it would be a comparatively simple matter for invading cedars to secure a foothold and ultimately, by reason of their larger size and the dense shade produced by their close set crowns, to eliminate the former tenants.

Having outlined the role which certain historical factors have probably played in the origin and evolution of the plant life of Connecticut, there remains to be considered the manner in which coexisting forces influence the character of the flora. In the present paper only those phases need be treated which concern plant distribution in the large. The ultimate or climax formation attained in the region under surveillance, *i. e.*, the most mesophytic permanent type of vegetation which is capable of develop-

ment, is a forest composed largely of deciduous trees and hemlock. Considering this forest as a unit the following comprise the most important arborescent species:

Castanea dentata	*Liriodendron Tulipifera*
Quercus rubra	*Fraxinus americana*
Quercus alba	*Tilia americana*
Acer Saccharum	*Betula lutea*
Acer rubrum	*Pinus Strobus*
Fagus grandifolia	*Prunus serotina*
Tsuga canadensis	*Hicoria* sp.

But the forest is by no means uniform in structure throughout the state. Most widely disseminated and of greatest economic importance is the "sprout hardwood" type which represents the usual climax formation over fully five sixths of the state. This type of forest attains its highest development in the central lowland and along the coast, where it is dominated by chestnut, oaks, and red maple. The tulip tree is commoner here than elsewhere; *Ostrya virginiana* and *Cornus florida* are conspicuous secondary species; while *Hamamelis virginiana* and *Kalmia latifolia*—this latter the State Flower of Connecticut—are almost universally present. In eastern Connecticut the chestnut is of comparatively subsidiary importance, oaks being the dominant trees; the forest here is obviously less mesophytic than in the lowland and along the coast. But it is in the northwesten part of the state that the most mesophytic conditions prevail, and the climax forest here conforms with the "northern hardwood" rather than the "sprout hardwood" type. Here hemlock, beech, and sugar maple, together with yellow birch characterize the virgin woodland; (FIG. 3) *Acer pennsylvanicum* and *Acer spicatum* replace the hop hornbeam and dogwood; while, in addition to the omnipresent laurel, the undergrowth is made up very largely of *Viburnum alnifolium* and *Taxus canadensis*. To what degree these modifications in forest composition should be attributed to contemporaneous factors cannot be definitely decided. In a measure the presence or absence of particular species may be the result of geographic position, but it seems

more likely that their scarcity or abundance is determined by physiographic or climatic factors.

Owing chiefly to its geographical location and topographic diversity Connecticut may be regarded as a sort of transitional area between the north and the south where both boreal and austral

FIG. 3. Interior of virgin northern hardwood forest at Colebrook. Hemlock and beech with characteristic undergrowth.

forms can find favorable environmental conditions. This state represents the southernmost extent of range in the east,[1] so far as recorded, for nearly 70 plants of northward distribution, while about 80 species of southward range apparently reach here their northern limit in the east. As might be anticipated, the rugged highland regions possess a flora rich in boreal forms, while the preponderance of austral species is encountered long the coast and in the central lowland. From a phytogeographical standpoint three well defined centers of distribution within the state

[1] Some species which extend farther south along the mountains have been included in this estimate.

may be recognized. Reference has already been made to the southeastern center. Similarly the southwestern section may be looked upon as including the usual route along which northbound immigrants from the south today invade the state. It is in this area that *Melanthium latifolium*, *Liquidambar Styraciflua*, *Pyrus arbutifolia*, *Viburnum prunifolium*, *Crotonopsis linearis*, *Oenothera longipedicellata*, and *Cacalia suaveolens* reach their northern limit in the east; while many other species, such as *Wolffia columbiana*, *Aristolochia Serpentaria*, *Cimicifuga racemosa*, *Heuchera americana*, *Rubus cuneifolius*, and *Ilysanthes anagallidea*, which extend locally into other parts of Connecticut, are frequent or common here. Northwestern Connecticut, on the other hand, constitutes a natural center of distribution for boreal species. Mention has already been made of the nature of the climax forest in this region. The swamps, likewise, are suggestive of the north; for here, as nowhere else in the state, tamarack swamps are of frequent occurrence; while the spruce, elsewhere represented by dwarfed, scattered specimens, becomes in the bogs of northern Litchfield County a tree of goodly proportions, and in at least one locality forms a forest of appreciable extent. Furthermore, on the northern slopes of some of the higher mountains in this section spruces fifteen or more meters in height are sometimes found growing as upland mesophytes. The balsam fir (*Abies balsamea*) and arbor vitae (*Thuja occidentalis*) are also native at several stations in northwestern Connecticut. Altogether no less than 90 species of plants have been recorded *only* from this part of the state, and of these fully 30 per cent. reach here their southernmost limit of range in the east.[1] In the subjoined list are given a few of the seed plants which are apparently restricted to this area.

Cinna latifolia	*Mitella nuda*
Carex Bebbii	*Ribes prostratum*
Carex pauciflora	*Potentilla tridentata*
Carex paupercula	*Dalibarda repens*
Streptopus amplexifolius	*Viola nephrophylla*

[1] This estimate also includes some species which range farther south along the Alleghanies.

Habenaria macrophylla
Spiranthes Romanzoffiana
Salix candida
Betula pumila
Ranunculus circinatus
Epilobium palustre
Vaccinium canadense
Galium trifidum
Solidago uliginosa
Petasites palmatus

In addition to these three centers of distribution there are several other areas in which the character of the flora may similarly be ascribed to factors of more or less widespread influence. Foremost and most sharply delimited is the maritime province, which embraces the salt marshes and sea beaches. Salt marshes (Fig. 4), with their distinctive halophytic vegetation,

FIG. 4. Salt marsh at East Haven. Tidal creek in foreground.

are a familiar feature along the shore, developing behind barrier beaches or in sheltered inlets and frequently covering an area of several square miles. Along the Connecticut and Quinnipiac Rivers they extend inland a distance of six or eight miles, gradually merging into the fresh water swamps. Except for two shrubs

—*Iva oraria* and *Baccharis halamifolia*—all salt and brackish marsh species are herbaceous, and grass-like forms are predominant. The appended list includes some of the commoner representative species.

*Triglochin maritima**	*Atriplex patula hastata**
Spartina glabra	*Salicornia europaea**
Spartina patens juncea	*Salicornia mucronata*
*Spartina Michauxiana**	*Suaeda maritima*
*Distichlis spicata**	*Limonium carolinianum*
Cyperus Nuttallii	*Gerardia maritima*
*Eleocharis rostellata**	*Plantago decipiens*
*Scirpus Olneyi**	*Solidago sempervirens*
Scirpus robustus	*Aster tenuifolius*
*Scirpus campestris paludosus**	*Aster subulatus*
*Juncus Gerardi**	*Pluchea camphorata*

Along the sandy beaches which fringe the coast two classes of plants may be distinguished, viz., those able to grow in the more or less saline soil of the beach proper, and those restricted to the aeolian sands of the low dunes which usually cover the beach on its landward side. Peculiar to the beach itself are:

Atriplex arenaria	*Euphorbia polygonifolia**
*Salsola Kali**	*Xanthium canadense**
Arenaria peploides	*Artemisia Stelleriana*
*Cakile edentula**	

Characteristic of the dunes are:

*Ammophila arenaria**	*Lathyrus maritimus**
Panicum amaroides	*Strophostyles helvola**
Panicum oricola	*Lechea maritima*
Cyperus Grayii	*Hudsonia tomentosa**
*Myrica carolinensis**	*Oenothera Oakesiana**
*Prunus maritima**	*Solidago sempervirens*

The ecological relations of the salt marsh and beach floras will be given more special treatment in a later paper, but it may be further noted here that not a few of the inhabitants of these areas

—*e. g.*, the species above marked with an asterisk—find a home in similar situations along the Great Lakes and westward.

There is still another group of plants, which are neither halophytic nor littoral but which, while frequent or common in the vicinity of the coast, rarely extend inland more than a few miles. Prominent among these are:

Woodwardia areolata	*Opuntia vulgaris*
Lycopodium inundatum Bigelovii	*Hottonia inflata*
Lilium superbum	*Rhexia virginica*
Iris prismatica	*Gerardia purpurea*
Habenaria ciliaris	*Eupatorium hyssopifolium*
Quercus stellata	*Artemisia caudata*

The cause of the coastward affinity in such plants is not wholly clear, but it should be pointed out that practically without exception the species concerned attain their optimum development farther south, while a large percentage of them are restricted to the Atlantic coastal plain, the Mississippi basin, and the region around the Great Lakes. Hardly less remarkable from a distributional standpoint is a second group of plants, also mainly southern in range, which are largely confined to the coast and to the valleys of the larger rivers. Representative of this class are:

Panicum virgatum	*Solidago odora*
Dioscoraea villosa	*Aster novi-belgii*
Cassia Chamaecrista	*Helianthus giganteus*
Onosmodium virginianum	*Bidens laevis*
Sicyos angulatus	*Bidens discoidea*

It seems probable that the limited distribution of these last two groups may in some way be associated with atmospheric conditions. There is an additional element in the river flora, however, whose presence is unquestionably due to edaphic rather than climatic factors. As illustrations, the cottonwood (*Populus deltoides*) and the silver maple (*Acer saccharinum*) may be selected. Although scattered locally throughout the state, it is only on the flood plains of the larger rivers that these two trees find conditions congenial to their optimum development. Here,

particularly along the Connecticut River, they form a conspicuous feature of the vegetation, frequently controlling large areas. Equally characteristic of—and where marked by an asterisk confined to—alluvial soil along the rivers are the following species:

Onoclea Struthiopteris	*Eleocharis diandra**
*Equisetum pratense**	*Eleocharis ovata*
*Equisetum palustre**	*Carex Grayii**
Equisetum fluviatile	*Carex Tuckermani**
*Equisetum variegatum Jesupi**	*Salix longifolia**
*Sagittaria arifolia**	*Acer Negundo**
Sagittaria heterophylla	*Hypericum Ascyron**
*Cyperus erythrorhizos**	*Ambrosia trifida*

In contrast to the plants in the two preceding lists it will be observed that more than half of the species here cited are boreal in their general distribution, no less than five reaching their southern limit in the east in Connecticut.

Although the primary object of the present paper is to describe some of the larger and more conspicuous features of plant distribution in this state, such an account would be incomplete without some mention of the eccentricities in range which are exhibited by certain species not heretofore noted. One of the best known examples of this sort is furnished by the persimmon (*Diospyros virginiana*), of which there is a well-established colony of more than 100 trees growing near the beach at Lighthouse Point, New Haven,—a station which was probably noticed as long ago as 1831[1] (Fig. 5). This tree has been found nowhere else in New England and the nearest locality to the south—in western Long Island—is fully 60 miles removed. An analogous case is afforded by the spike rush *Eleocharis quadrangulata*, which is abundant at West Pond, Guilford. Although the largest and most distinctive native species in the genus, no other station for it is known within a radius of 110 miles. Similarly, *Calliergon trifarium*, a handsome

[1] Howe, H. Catalogue of the phaenogamous plants and ferns growing without cultivation within five miles of Yale College, p. 13. New Haven, 1831. No definite station is given.

FIG. 5. Grove of persimmon (*Diospyros virginiana*) at Lighthouse Point, New Haven. Photograph taken about 1899 by Dr. W. E. Britton.

moss which is recognizable almost at a glance, grows luxuriantly in a bog at Salisbury but is reported from only six other North American localities, the nearest of which is more than 250 miles away. Another Connecticut moss, *Claopodium pellucinerve*, is apparently known elsewhere only from Yukon Territory and northern India. But even more puzzling are those cases where two species reach respectively their northern and southern limits at one and the same station. Three instances of this sort occur to the writer. In 1892 two ferns, *Cheilanthes lanosa* and *Cryptogramma Stelleri*, were collected on West Rock, a trap ridge near New Haven, where they grew side by side in crevices on the precipitous face of the rock. The first named species is widely distributed in the southern United States, but is unknown elsewhere in New England, the nearest recorded stations being along the Hudson River, more than 60 miles distant. The latter species is a northern calcicolous form which also occurs locally in the northwestern part of the state. Owing to the inaccessability of their eerie no one in recent years has ventured to ascertain whether this interesting station still exists. In a similar manner two mosses, *Pogonatum brachyphyllum* and *Aulacomnium androgynum*—the former a coastal plain form not otherwise reported north of southern New Jersey, the latter a boreal species which until recently had never been collected south of northern Massachusetts—grow on granitic ledges along the shore of Long Island Sound at stations less than a mile apart, while the two liverworts, *Anthoceros Macounii* and *Ricciella membranacea*, reach respectively their southern and northern limits in central Connecticut, where at Hartford they grow intermixed in the same ditch. No attempt is made to explain such anomalous vagaries of distribution. It would almost seem that the caprices of chance had overridden the natural laws of dissemination, and while edaphic factors may doubtless account for the persistence of a plant after it has once become established it is difficult to reconcile such antithetical associations as the last three above noted.

The chief factors which to-day control the distribution of the vegetation within the state may be summed up under two heads:

physiography and climate. From a geographical standpoint the state of Connecticut is naturally subdivided into three areas, viz., an eastern and a western highland and a central lowland. The boundaries of these divisions are roughly indicated on the accompanying map (fig. 2). The highlands, underlain by resistant granites, gneisses, and schists, contrast sharply with the lowland where the bed rock is composed largely of soft shales and sandstones. The contour of the highlands is for the most part rugged, but it is in the northwestern section of the state, among the southern Berkshires, that the greatest unevenness prevails. Elevations of 450 meters are common here, while there are several mountains over 600 meters in height. Not only do the greater altitude and the irregularity of the surface favor the presence in this latter region of northern plants but, as will be seen presently, these physiographic features are accompanied by climatic differences. In the lowland the surface is more nearly level, hills are frequent but high elevations are absent, while except along the two trap ranges, which traverse the region from north to south, precipitous cliffs and deep ravines, such as often abound in the highlands, are scarce. The contrast between highlands and lowland has even been accentuated by the activity of the glaciers; for in the former regions the debris deposited by the retreating ice sheet as a rule is heterogeneous and very unevenly distributed, while in the flatter lowland the till has been buried to a large extent beneath layers of stratified sands, gravels, and clays, so that the structure of the surface soil tends to be much more uniform. Among the most impressive features of the lowland, both from a physiographic and an ecological point of view, are the extensive sand plains—broad, level stretches which in places are utterly devoid of any but the sparsest and most xerophytic plant growth (Fig. 6). Such areas are usually populated by a flora which is preëminently southern in aspect, the northern element being correspondingly scarce. Other instances of a similar correlation between physiographic features and the character of the vegetation might be cited, but the discussion of these is better taken up later in connection with local problems.

Except in a superficial way little is known regarding the influence

of the chemical composition of the soil upon plant distribution. There are, however, quite a number of reputedly calcicolous

FIG. 6. Sand plains at North Haven. *Quercus ilicifolia* and clumps of *Andropogon scoparius* in foreground. In mid-distance an Andropogon "prairie" with scattered trees. View taken in March.

plants which in Connecticut would appear to be confined to the limestone areas in the western part of the state. Representative of these are:

Pellia Fabroniana
Lophozia badensis
Amblystegiella confervoides
Cratoneuron filicinum
Trisetum spicatum
Carex Crawei
Carex Castanea
Lobelia Kalmii
Arenaria stricta

Still other species, although not restricted to limestone, seem to be limited to calcium-containing substrata. Thus, *Grimaldia fragrans*, *Encalypta ciliata*, *Cryptogramma Stelleri*, *Asplenium Ruta-muraria*, *Carex eburnea*, and *Solidago squarrosa* have been found only in the limestone districts and on the trap ridges.

Although the existence of perceptible climatic differences within the state is unquestioned, it is as yet somewhat problematical to how great a degree the observed vegetational differences have been actuated by atmospheric factors. To a limited extent, however, it has been possible to coördinate more or less definitely with the phenomena of plant distribution meteorological data

relating to rainfall, evaporation, and temperature. In a series of experiments conducted during the past summer and described in detail elsewhere[1] it was demonstrated that, taking the ratio between the amount of water precipitated in the form of rain and that lost by evaporation as a criterion, there is a distinct correlation between the quantity of water theoretically available for plant use during the growing season and the distribution of forest types. In brief, it was found that while during the period of observation the rate of evaporation throughout the state far exceeded the rate of rainfall, there was an appreciable difference in the ratios between loss and gain in different regions. The estimated ratios were as follows: (*a*) western highland (interior) —.46; (*b*) central lowland (interior)—.35, coast—.36; (*c*) eastern highland (interior)—.31. These regions coincide approximately with (*a*) the northern hardwood area; (*b*) the sprout hardwood area dominated by chestnut; and (*c*) the sprout hardwood area dominated by oaks. Similarly temperature suggests a plausible explanation for the restriction of so many southern species to the immediate proximity of the coast, for while the length of the growing season in the interior averages 148 days, it is found that along the shore 177 days normally intervene between the last killing frost of spring and the first killing frost of autumn. It may be worthy of note also that in passing from east to west along the coast—from the shore of the ocean to the shore of Long Island Sound—there is a gradual diminution in the length of the season from 194 days at New London to 159 days at Norwalk. The longer growing season in southeastern Connecticut might be urged as a possible explanation for its peculiar flora, but an objection to such a view is the fact that over half of the plants noted above as *confined* to this section of the state have been found more than ten miles inland, notably at Voluntown where the growing season averages less than 140 days. The climate of northwestern Connecticut, on the whole, is cooler than elsewhere in the state, a fact which may be more or less intimately associated with the aspect of the vegetation there.

[1] Evaporation intensity as a determining factor in the distribution of vegetation in Connecticut. Botanical Gazette. In course of publication.

By way of summary it may be stated that the distributional phenomena herein described represent the cumulative effect of dynamic physical and chemical forces, some of which have long since become inactive while others continue to exert a modifying influence upon the physiognomy of plant life. In so far as they have either hindered or facilitated plant dissemination historical factors in a general way may be regarded as directly responsible for the composition of the local flora, while indirectly those glacial and preglacial forces which moulded the present physiographic features of the landscape still affect the character of the vegetation. To a very appreciable degree certain observed aspects of plant distribution are associated with contemporaneous conditions of topography, soil, and climate.

Yale University.

SHORTER NOTES

Botrychium obliquum and var. dissectum in Berrien Co., Michigan.—The seventh edition of Gray's Manual records these two plants as often occurring together in New England, New York, and Ohio. It may be of interest to note that they occur further westward, and possibly throughout the entire range of the typical form. October 19, 1912, in company with a class from the University of Chicago, I found several specimens of both growing together in an open wood near Sawyer. E. J. Hill in the *Fern Bulletin* for April 1912, states that both are found in Peoria Co., Ill., although he does not say that they are found together.

It is also of interest that while all the plants of the species were large and fertile (the spores not yet shed), those of the variety were only about one third as large, and consisted of the sterile segment only. It would appear from the specimens examined that *dissectum* is only a juvenile form of the species, but the material is too scanty to draw any conclusions as to this.

Edwin D. Hull

REVIEWS

A New Color Guide*

A new color guide by Dr. Robert Ridgway, the well-known ornithologist, is practically an entirely revised and much enlarged edition of his earlier nomenclature of colors (1886) with 17 plates and 186 colors as against 53 plates and 1,115 colors in the present work. The color work was done by A. Hoen & Co., of Baltimore and is much more uniform in different copies than in the earlier edition, which was hand stenciled from several mixings of the same color; while in the present work each color for the whole edition of 5,000 copies was prepared from one lot of color and uniformly coated at one time. While the present work does not contain quite as many colors as are included in the more bulky French work by Rene Oberthur, the gradation between colors is more uniform, and the colors are on dull instead of glossy-surfaced paper as in that work, which gives a slightly different, but more natural color effect, and no metallic color effects are included. The proportion of darker broken colors is greater, which will appeal especially to the ornithologist and mammalogist, although the work is designed to be equally useful to botanists, florists, artists, dyers, merchants, and chemists who require a standard color scheme. The colors have evidently been standardized to a degree of accuracy not hitherto attained in any color chart. The colors are one half by one inch, arranged on a heavy gray paper in three vertical columns of 7 colors each. The plates are divided into 6 series. In plates I–XII the middle row of horizontal colors represents the 36 colors and hues most readily distinguished in the spectrum, although it is said to be possible to distinguish 1,000. Above these colors each succeeding horizontal row of colors is the spectrum color mixed with 9.5; 22.5; and 45 per cent of white. Below they are mixed with 45; 70.5 and 87.5 per cent of black. Plates XIII–XXVI represent the colors in plates I–XII dulled by 32 per cent of neutral gray; plates XXXII–XXXVIII are

* Color Standards and Color Nomenclature. By Robert Ridgway, (3447 Oakwood Terrace, N. W.) Washington. Published by the author 1913. Pp. 1–44; pls. I–LIII. $8.00.

dulled by 58 per cent of neutral gray; plates XXXIX–XLIV are dulled by 77 per cent of neutral gray; plates XLV–L are dulled by 90 per cent of neutral gray; and plates LI–LIII are dulled by 95.5 per cent of neutral gray. If the color to be matched is darker than in the first series of plates turn to the same position in the succeeding 5 series of plates until one is found that is dark enough to match. This is readily done by referring to the numbers at the head of the vertical columns and to the letters at the left of the horizontal rows. In numbering and lettering the rows of colors every other number and letter has been omitted so that colors that do not exactly match any in the present work, but are intermediate can be designated by a symbol. For example, in plate I the vertical columns are 1, 3, and 5; the tints *b*, *d*, and *f*; and the shades *i*, *k*, and *m*. All the colors are named as well as symbolized, but if a given color comes between Hermosa pink (1 *f*) and eosine pink (1 *d*) it could be designated 1 *e*. In this manner about 2,385 additional colors or a total of 3,500 can be designated. Undoubtedly exception will be taken to some of the names, but in this the personal equation plays such a large part that decisions must be rather arbitrarily rendered. The primary colors have been standardized by Dr. P. G. Nutting of the U. S. Bureau of Standards.

It was originally expected that six months would suffice for the preparation of the colors, but unforeseen difficulties in reproduction have extended this period to about three years.

A list of color synonyms as shown by the immense list of trade samples that must have accumulated would have formed an exceedingly interesting and valuable addition to the work.

A table of percentages of color, together with an explanation of the amount of white, black, or neutral gray used as above, will give an approximately ready clue to the reproduction of any color in the guide, the only uncertain factor being the possible lack of standardized primary colors to begin with.

Definitions of the principal color terms, such as color, shade, tint, hue, tone, etc., which are used almost interchangeably by many people, will repay careful study by those not familiar with their exact use.

A slight error on page 12, due to a misunderstanding, should be corrected. Mr. F. A. Walpole had no connection with the color project of the American Mycological Society, the preparation of which was delegated to the late Dr. L. M. Underwood, Dr. W. A. Murrill, and the writer. Mr. Walpole died before the committee was appointed, and the project was abandoned after two years' work by the committee in favor of Doctor Ridgway's work, which had not previously come to their notice.

P. L. Ricker

PROCEEDINGS OF THE CLUB

February 11, 1913

The meeting of February 11, 1913, was held in the West Room of the Museum of Natural History at 8:15 P.M. In the absence of the president and secretary, Dr. E. B. Southwick occupied the chair. Ten persons were present.

The reading of the minutes of the meeting of January 29 was dispensed with, and the scientific programme for the evening was in order.

It was entitled: "The Photographing of Wild Flowers," by A. J. Grout, Ph.D., and was illustrated by lantern slides, both hand-colored and by the color processes of Lumiere and Dufay.

At the close of the meeting a request was made by the chair for a list of plants shown. They were in part as follows:

Lilium canadense
Maianthemum canadense
Oakesia sessilifolia
Smilacina racemosa
Hypoxis hirsuta
Iris versicolor
Pogonia verticillata
Cypripedium acaule
Habenaria fimbriata
Habenaria ciliaris
Salix discolor
Claytonia virginica
Actaea alba (in fruit)
Anemone quinquefolia
Anemonella thalictroides
Aquilegia canadensis
Caltha palustris
Hepatica triloba
Podophyllum peltatum
Sanguinaria canadensis
Saxifraga virginiensis
Potentilla canadensis
Pyrus arbutifolia
Spiraea tomentosa
Spiraea salicifolia
Geranium maculatum

Celastrus scandens (In fruit.)
Hibiscus Moscheutos
Epilobium angustifolium
Cornus florida
Epigaea repens
Kalmia latifolia
Monotropa uniflora
Pyrola elliptica
Rhododendron nudiflorum
Gentiana crinita
Apocynum androsaemifolium
Gerardia pedicularis
Linaria vulgaris
Orobanche uniflora
Houstonia coerulea
Mitchella repens
Antennaria sp.
Rudbeckia hirta
Chrysanthemum leucanthemum
Robinia pseudacacia
Orontium aquaticum
Caulophyllum thalictroides
Pedicularis canadensis
Sabbatia stellaris
Limonium carolinianum
Viola rotundifolia
Viola pedata
Viola cucullata
Arisaema triphyllum
Symplocarpus foetidus
Vaccinium sp.

Adjournment followed.

SERENO STETSON,
Secretary pro tem.

FEBRUARY 26, 1913

The meeting of February 26, 1913, was held in the laboratory of the New York Botanical Garden at 3:30 P.M. Vice-president Barnhart presided. Thirteen persons were present.

The minutes of January 29 and February 11 were read and approved.

The following were elected to membership: Mr. James Kelly, 2163 Gleason Avenue, New York City; Mr. Francis W. Pennell, Wawa, Pennsylvania; Mr. J. K. Henry, 2024 Beach Avenue, Vancouver, B. C.; and Amji di Lignari, 549 West 113 Street, New York City.

The scientific program consisted of a paper by Dr. E. W. Olive on "The Life History of the Rusts."

Four types of development were recognized, (1) Micro and Lepto, (2) Brachy, (3) Opsis, (4) Eu or complete forms. Dr. Olive holds to the view that the simpler micro and lepto types consisting of pycnidia and teleuto only are the more primitive, from the standpoint of development, and that the so-called repeating spores, the aecidio and uredo have been intercalated between these. The origin of heteroecism was briefly discussed.

The heteroecious rusts probably arose from the autoecious eu-forms, the change of hosts being made by the aecidiospore.

A study of the rusts having a perennial mycelium shows that about eighty such forms are known at present. Of these the numbers are about equally divided between those in which the gametophytic mycelium is perennial and those in which the sporophytic is perennial. Of especial interest are a few forms in which both a perennial gametophytic and a sporophytic mycelium occur on the same host. *Puccinia suaveolens*, *Uromyces glycyrrhizae* and *Puccinia Podophylli* are examples of this.

The yearly origin and dissemination of the rusts of the cereal grains was next discussed. Dr. Olive thinks it highly probable that infected seed produce infected plants and that this will explain the existence of wheat rust in regions free from barberry.

F. D. Fromme,
Secretary pro tem.

NEWS ITEMS.

Dr. Henry A. Gleason is to act as assistant professor of botany at the University of Michigan summer school, located near the Straits of Mackinac. Dr. H. N. Whitford and Mr. Guy West Wilson will also teach at this school during the coming summer.

At a recent meeting of the trustees of Wellesley College the following new appointments were made in the department of botany: Maude Gilchrist, associate professor; Christine F. Chapman, assistant; Helen I. Davis, curator of museum; Anna W. Devereaux, lecturer.

According to the *Evening Post* Prof. A. S. Pearse of Wisconsin University will accompany a scientific expedition to Colombia, South America, next summer, to study the plants and animals in the vicinity of Santa Marta. Dr. J. Ruthven, of Michigan, will lead the expedition.

Dr. Frank K. Cameron, of the United States Bureau of Soils, was in Seattle in April, arranging for the departure of two expeditions, which will leave Seattle May 1, to investigate the kelps of Alaska as a source of potash fertilizer. One party, in charge of Professor T. C. Frye, head of the botany department in

the University of Washington, will work in southern Alaska. With him will be Professor Robert B. Wylie, of the University of Iowa, and Mr. Dean Waynick, a student at the University of Washington. The other party, in charge of George B. Rigg, instructor in botany in the University of Washington, and special agent of the United States Department of Agriculture in the kelp investigation in 1911 and 1912, will investigate the kelp groves of western Alaska. With him will be Professor Robert F. Griggs, of Ohio State University, and Mr. Sanford M. Zeller, graduate assistant in botany in the University of Washington. A suitable fishing vessel has been chartered in Seattle for each expedition.

We regret to record the death on February 23 last of Mr. Henry Dautun, for many years an active member of the Torrey Club. He was born at St. Fargeau, Goune, France, in 1853. From his boyhood he displayed a natural taste for botany, which led to his collection of a herbarium, aggregating 31 thousand specimens, from all parts of the world. As mentioned in TORREYA for April, this collection was purchased by the Brooklyn Botanic Garden.

According to the *Evening Post*, Mary W. Stewart has been appointed as assistant in botany at Barnard for the coming school year.

From the same source, we learn that Miss W. J. Robinson, of Vassar, has been appointed as adviser for women at the summer school of the University of Wisconsin.

Mr. C. A. Wenzel, whose address is Jaro, Leyte, Philippine Islands, proposes to undertake an intensive botanical exploration of the Island of Leyte, one of the least known and most interesting islands in the Philippines from a botanical standpoint. His material will be determined by the botanists at the Bureau of Science, Manila, with the assistance of various specialists. Mr. Wenzel will be glad to enter into correspondence with any botanist or institution that desires Philippine botanical material.

Miss Eliza Shaw Torrey, the only surviving daughter of the late Dr. John Torrey, died in San Diego, California, on March 27, 1913. As recorded in TORREYA for January, Miss Torrey's

sister, Jane R. Torrey, died on December 14, last. Dr. Herbert J. Torrey, a brother of the recently deceased Misses Torrey, is the only surviving member of the family of Dr. John Torrey, the founder of the Torrey Club.

Addison Brown, for many years president of the Torrey Club, died on April 9, at his home on West 89th Street. He was born February 21, 1830, in West Newbury, Essex County, Mass. The son of Addison and Catharine Babson Griffin Brown, his ancestors on both sides were among the early settlers of that state, the Rev. John Rogers, on his mother's side, having been a graduate of Harvard College in 1649, and its president in 1682, another ancestor being Thomas Dudley, second Governor of Massachusetts. In 1848, he entered Amherst College, and in 1849 joined the sophomore class at Harvard, where he graduated second in rank, in 1852. For twenty years he served with distinction as judge of the United States District Court for the southern district of New York. He devised the charter of the New York Botanical Garden, and his subsequent services to that institution have been very great. He was president of the garden at the time of his death. In 1896–8, he published with Dr. N. L. Britton the well-known "Illustrated Flora." Besides the Torrey Club, Judge Brown was a member of the New York Geographical and Historical Societies, of the Century and Metropolitan Clubs, and the Sons of the American Revolution. His largest public bequest, estimated at $21,750, is to the New York Botanical Garden. He gives that organization 200 shares of United States Steel preferred, to be known as the Addison Brown fund, "the income from which shall be applied to the founding of a high class magazine bearing my name, to be devoted exclusively to illustration by colored plates of the plants of the United States and its territorial possessions."

Mr. J. T. Sarvis, instructor in botany at the South Dakota State College, has resigned to enter the service of the United States Department of Agriculture, with headquarters at the dry land experiment station at Ardmore, South Dakota.

Dr. and Mrs. N. L. Britton and party have returned from a three months' botanical exploration of the West Indies.

Mr. J. Pierpont Morgan died in Rome, on March 31. Besides the many other activities in which Mr. Morgan was interested, he was a member of the board of managers of the New York Botanical Garden.

A telegraphic dispatch to the *Evening Post* announces the appointment of Dr. William Trelease, recently director of the Missouri Botanical Garden, as professor of botany in the University of Illinois, at Urbana. He succeeds Dr. T. J. Burrill, retired, who, as professor, dean, and vice-president, has been connected with the university since 1868.

The geological survey of Alabama has still some copies of "Mohr's Plant Life of Alabama," for distribution. Bound or unbound copies are to be had gratis by applying to the State Geologist, University, Ala. Thirty-two cents in postage should be sent in letters asking for the book.

Professor Lester F. Ward, recognized as one of the foremost American social philosophers, a geologist of note and author of many scientific works, died April 18, at Washington, aged eighty-one years. He was a native of Joliet, Ill. Professor Ward was first president of the American Sociological Society, at different periods served as president of the Institute International de Sociologie, and as a member of the faculty of Brown University, and for many years was on the staff of the National Museum.

Among Professor Ward's written contributions to science are "Dynamic Sociology," "Sketch of Paleobotany," "Synopsis of the Flora of the Laramie Group," "Types of the Laramie Flora and Geographical Distribution of Fossil Plants." He also collaborated with James Q. Dealey in the writing of a textbook on sociology.

Dr. Ira D. Cardiff, professor of plant physiology and bacteriology in the Washington State College, has been made head of the department. Professor J. G. Hall, of Clemson Agricultural College, South Carolina, has been appointed professor of plant pathology at the same institution.

The Torrey Botanical Club

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* Died February 1, 1913.

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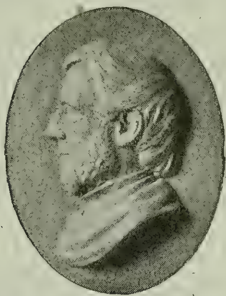
BY

NORMAN TAYLOR



JOHN TORREY, 1796–1873

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THE FLORA OF COPAKE FALLS, N. Y.

By Sereno Stetson

One hundred and five miles north of New York City, on the Harlem Division of the New York Central Railroad, lies the little town of Copake Falls (railroad station Copake Iron Works) in Columbia County, N. Y. Perhaps the location may be more readily brought to mind by saying that it lies just north of the point where New York, Massachusetts and Connecticut converge, and next the Massachusetts state line.

Its name is derived from the Indian, and when translated signifies "Great Barrier." This is most appropriate, for as one approaches the town from the "Flats" on the west, his attention is immediately attracted by the number of mountains seemingly piled together at this point; Mt. Washington, in Massachusetts, Mt. Elander, Cedar and Bash-Bish Mountains. These almost touch at their bases and form a gorge of exceeding beauty for a distance of three or four miles.

Bash-Bish Brook, which follows this gorge for its entire distance, has its origin in four or five spring-fed brooklets on the western slopes of Mt. Washington and enters the "Gap" in the form of a beautiful waterfall fifty feet in height, and plays an important part in the natural distribution of the plants.

The topographical features are many. On the north lies a plateau ranging from 950 to 1,100 feet above sea level. On the east and south lie the mountains before mentioned, and on the west the lowlands ranging 750 to 800 feet above sea level. The summit of Cedar Mountain, about 1,000 feet above the town, is swampy and furnishes, even during the driest season, numerous small "trickles" which eventually find their way into

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Bash-Bish. The western side of the town is dotted, here and there, with a number of treacherous bogs varying from one to ten acres in area. In these places many interesting forms of plant life are found while the vicinity of Bash-Bish Falls, to the east, abounds with rare ferns and mosses.*

This area comes within the local flora and in visiting it two or three times yearly since the spring of 1904, the writer has noted the coming, now and again, of plants heretofore only found considerably to the east, in Massachusetts. This leads him to the belief that it is one of the points where plants find a natural crossing over the Taconic Mountains, and thus down into eastern New York helped along by Bash-Bish and Hillsdale (Jansen) Brooks.

The gap is winding, stretching from east to west, with the highest mountains on its southern side. This makes the location cool and moist, and it is not uncommon to find spring plants in bud and blossom after the summer has far advanced.

Some years ago, when the iron mines were in operation, the neighboring hills were practically denuded of their timber for use as supports in the shafts, and a second growth of formidable size stands in its place. Chestnut formed a good percentage of the lower level growths and yearly yielded large crops until the disease made its appearance some five or six years ago. Since then not enough nuts have been gathered to market and these beautiful trees, two to three feet in diameter, are now decaying masses. Pines, cedars, hickory, maples, oaks and large stands of white birch now form the major part of the woods, and great difficulty is experienced in keeping the latter from cleared farm land.

As a botanical hunting ground it is ideal. Numerous soil formations with a perfect water supply from innumerable small brooks make all forms of plant life possible, and the dry ridges on the northwest furnish specimens of stunted growth valuable for comparison. The following list, which excludes weeds, is by no means complete and is only intended to convey an idea of the flora.

* The Rare Mosses of Bash-Bish Falls. Elizabeth G. Britton. TORREYA 1: 9. 1901.

FIG. 1. Road through the gap, Cedar Mt. in the distance. *Gentiana quinquefolia* is found here. Copake Falls, N. Y.

MONOCOTYLEDONES

Typha latifolia L.

Typha angustifolia L. Both of these are fairly numerous on the lower levels in usual surroundings. June, July.

Arisaema triphyllum (L.) Schott. In shaded localities immediately adjacent to brooks. Mostly on the lower levels. June, July.

Symplocarpus foetidus (L.) Nutt. Usual location and seasons.

Erythronium americanum Ker. In low shady woods, not common. May.

Lilium philadelphicum L. Solitary individuals growing in the high and dry portions of deciduous woods. Not common or found on the lower levels. Late July, August.

Maianthemum canadense Desf. Usual locations, fairly common. Late May.

Oakesia sessilifolia (L.) Wats. In roadside woods and thickets on lower levels. Late May.

Polygonatum biflorum (Walt.) Ell. In low damp woods, generally on slopes. May, June, with large fruits maturing late in September.

Smilacina racemosa (L.) Desf. Usual location, mostly along roads and trails. May, June. Fruits maturing late in August.

Trillium erectum L. Not rare. Blossoms late in May in usual locations., this year much earlier.

Uvularia perfoliata L. Late May, June, not common.

Hypoxis hirsuta (L.) Coville. Late May in usual locations.

Iris versicolor L. This plant is found only on the lowest level and is a continuation of the distribution which follows, in the water ways, adjacent to the Harlem Railroad track from New York City northward. Blossoms and fruits at the usual seasons.

Sisyrinchium angustifolium Mill. In long grass near borders of woods, dry location. July, August.

Corallorrhiza maculata Raf.

Corallorrhiza trifida Chatelain. These plants found only among rocks in damp, coniferous woods alongside of "trickles" and

FIG. 2. Junction of Bash-Bish and Cedar mountains. Note deciduous trees of Cedar Mt. and evergreen trees of Bash-Bish Mt. Copake Falls, N. Y.

not common. Both flower in July and August, their fruit maturing in late September and October.

Cypripedium acaule Ait. Only one colony known in the immediate vicinity. On hillside in dry deciduous woods at an altitude of 1,100 feet. July.

Cypripedium pubescens (Willd.) Knight. Scattered plants growing directly under low hanging branches of isolated conifers. Late June.

Habenaria psycodes (L.) Sw. In usual surroundings on lowest levels. August.

Habenaria blephariglottis (Willd.) Torrey. In usual surroundings on lowest levels. Late May, June. Both of these plants are only found in the boggy ground west of the railroad tracks and north of the station. Not common.

Spiranthes gracilis (Bigel) Beck. Up to a few years ago these plants were found in comparatively small numbers in the coniferous woods, blossoming during July and as late as October 21, at an altitude of 1,000 feet and over. Of late they appear to be migrating to the lower cleared levels to the west, increasing in height and numbers.

Dicotyledones

Claytonia virginica L. Usual locations and seasons.

Actaea alba (L.) Mill. Usual season, roadsides and thickets.

Anemone quinquefolia L. In light woods during May and June.

Anemonella thalictroides (L.) Spach. Numerous in woods during May and June. Lower levels.

Aquilegia canadensis L. Found only out of the mountains in low, damp situations. June.

Caltha palustris L. Usual locations and seasons.

Hepatica triloba Chaix. Late April and May in high, semi-dry situations.

Radicula Nasturtium-Aquaticum (L.) Britten & Rendle. Cultivated but now wild in mountain brooklet. Altitude 1,200 feet. Blossoming in July.

Sarracenia purpurea L. In bogs on west side of railroad, very

FIG. 3. View from Lookout Rock. In the extreme distance are the Catskills. Copake Falls, N. Y.

numerous. Flowering at the usual time with fruit ripe in late September.

Drosera rotundifolia L. Inactive; found only in low ground, not common. July.

Mitella diphylla L. In roadside woods and along trails throughout the vicinity. May, June.

Parnassia caroliniana Michx. Found in large numbers throughout the boggy land to west of railroad. Late August, September.

Saxifraga virginiensis Michx. Usual location and season.

Hamamelis virginiana L. Found mostly on the higher ridges and in semi-dry locations. Usual seasons.

Fragaria vesca L. Abundant on the lower levels. Flowering at the usual season.

Potentilla argentea L. Usual location and seasons.

Potentilla canadensis L. Usual location and seasons.

Potentilla canadensis var. *simplex* (Michx.) T. & G. Usual location and season.

Potentilla fruticosa L. Found only on sunny, exposed portions of plateau to the north of "Gap." July, August.

Prunus serotina Ehrh. On exposed ridges and borders of woods, not frequent.

Rubus odoratus L. Common, along roads and trails in damp hillside-woods. Generally those with southern exposure. July.

Spiraea tomentosa L.

Spiraea latifolia Borkh. Open exposed ground on the lower levels. July, August.

Desmodium nudiflorum (L.) DC.

Desmodium paniculatum (L.) DC. Along roadsides through woods. Generally in rocky places. August, September.

Lespedeza frutescens (L.) Britton. Usual locations. August.

Geranium maculatum L. Usual locations. May.

Geranium Robertianum L. Rare, only once collected in damp, wet, sunless location, Sept., 1911. In fruit. Altitude 920 feet.

Polygala paucifolia Willd. Numerous on wooded slopes, especially those with northern exposure.

Celastrus scandens L. Found occasionally. Usual locations and seasons.

Impatiens biflora Walt. In quantities at foot of Bash-Bish falls and like situations, blossoming at the usual time.

Hypericum perforatum L. Common in sunny, exposed situations, in blossom at usual time.

Epilobium angustifolium L. In low, wet ground. August, September.

Oenothera biennis L. Usual location on lower levels. July, August.

Aralia nudicaulis L. In woody ravines adjacent to brooks. June.

Panax trifolium L. In damp woods. May.

Cornus florida L. Good sized trees, fairly common on the lower levels in damp situations. May. The common name of "dogwood" is rarely heard in this vicinity among the natives. It is almost invariably referred to as "shadblow." This, I am told, because of its "blowing" about the time that the shad make their appearance in the Hudson River. It must therefore have originated among the fisher-folk of the Hudson region many years ago.

Gaultheria procumbens L. Fair-sized colonies throughout the coniferous parts of the woods. July, August. Fruiting in October.

Kalmia latifolia L. Great numbers in past years, but rapidly thinning, due to tourists. July, fruiting in October.

Monotropa uniflora L. Not common, generally in low coniferous woods. July.

Pyrola elliptica Nutt. In low, damp woods. Common. July, fruiting in September.

Rhododendron nudiflorum (L.) Torrey. On the higher levels, generally along trails and wood roads. Perfume intense. Altitude 1,000 ft. and over. Profusely blooming in May.

Lysimachia quadrifolia L. Usual locations. June, July.

FIG. 4. View looking up the gap, Bash-Bish Mt. in the distance, evergreens predominating. Copake Falls, N. Y.

Trientalis americana (Pers.) Pursh. Good-sized colonies in deep, damp woods on border of Cedar brook. May.

Gentiana Andrewsii Griseb. Common in low, wet ground. August.

Gentiana quinquefolia L. Not common but increasing in numbers yearly, spreading westward in semi-dry, shaded locations. September.

Cuscuta arvensis Beyrich.

Cuscuta Coryli Engelm. In open, damp situations on *Aster* and *Solidago.*

Myosotis scorpioides L. In low, wet, unshaded ground, not frequent. July.

Verbena hastata L. Common in usual locations.

Collinsonia canadensis L. Rank weed in low, shaded places. September.

Monarda didyma L. Along Bash-Bish brook, not common. August.

Monarda fistulosa L. Large, scattered groups on dry, sandy, exposed hillsides. This plant is apparently new to this locality and appears to be spreading to the westward. September.

Physostegia virginiana (L.) Benth. This plant has newly arrived (1912). Some years ago the writer found it considerably to the eastward. Its present location in a small mountain meadow made marshy by the partial damming of a small brook by *Radicula,* which had formerly been in cultivation but now a rank growth. This brook has its source in the vicinity where the plant was first found. August. Large colony.

Pycnanthemum flexuosum (Walt.) B.S.P. Growing along roadside on steep, sandy banks. September.

Scutellaria lateriflora L. Wet, shady places. September.

Chelone glabra L. In wet shady places along brooks. The fact of a brook drying up does not appear to arrest development. August, September.

Gerardia flava L.

Gerardia pedicularia L. These frequent the trails in the lower woods, not numerous, but increasing in numbers. August.

Gerardia tenuifolia Vahl. Appears in large numbers in the deep grass of old fields in exposed locations. August, September.

Linaria canadensis (L.) Dumont. In dry, sandy places. August.

Linaria vulgaris Hill. There is only one station in the mountains with which the writer is acquainted. It is situated on the banks of a cold spring-fed brooklet and assumes large proportions. A specimen of inflorescence in the writer's herbarium was obtained from a plant 1.9 m. in height.

Mimulus ringens L. Along Bash-Bish and other brooks, in low, shady situations. August.

Veronica americana Schwein. Near or in mountain brooklets. July.

Orobanche uniflora L. Damp woodlands. May, June.

Campanula rotundifolia L. This plant is found in the rocky, cool places along the brooks and blooms later than usual continuing into late October. The basal leaves are very persistent and specimens collected throughout the season will almost invariably bear the round-cordate basal leaves.

Lobelia cardinalis L. Along the brooks, not common. August. September.

Lobelia inflata L. Frequent in low, damp woods. September, October.

Lobelia spicata Lam. Mostly found in long grass adjacent to woods. Seems to prefer sandy soil. August, September.

Anaphalis margaritacea (L.) B. & H. Exposed, dry hillsides. August.

Aster divaricatus L. Woods, common. August.

Aster dumosus L. Woods, common. August.

Aster ericoides L. Roadsides, common. August.

Aster Novi-Belgii L. Lower levels, near water. October.

Aster patens Ait. Dry woods, common. October.

Aster prenanthoides Muhl. Damp woods. September.

Aster sagittifolius Wedeæmeyer. Wood roads, trails, etc. October.

Aster Tradescanti L. Common on low levels. September, October.

Aster undulatus L. On upper levels in dry woods. October.

Erigeron pulchellus Michx. Not common, woods. May.

Erigeron ramosus (Walt.) B.S.P. Fields and roadsides, common. July, August.

Eupatorium perfoliatum L. Not common, on lower levels near brooks. August, September.

Eupatorium purpureum L. Roadsides and thickets in lower levels. September.

Eupatorium urticaefolium Reichard. Growing usually with *E. perfoliatum*, but also found occasionally on higher ground. August, September.

Gnaphalium polycephalum Michx.

Gnaphalium purpureum L. In open dry locations. September, October.

Helianthus decapetalus L. Bordering brooks in low, damp woods. September.

Hieracium scabrum Michx. Not common, dry localities. August.

Solidago arguta Ait. Roadsides and fields. August, September.

Solidago bicolor L. Common in woody paths. August, September.

Solidago erecta Pursh. Dry hillside. August, September.

Solidago graminifolia (L.) Salisb. Moist woods near roads. August.

Solidago hispida Muhl. Dry, rocky woods. August.

Solidago squarrosa Muhl. Rocky woods. September.

Tussilago Farfara L. In roadside trickles, spreading of late noticeably. May.

New York.

LICHENS FROM JAVA

By G. K. Merrill

The lichens here listed were collected by Mr. Max Fleischer in various localities of Java, and submitted to the writer for identification. The material proved of much interest from containing several rare and little known species.

LEPTOGIUM CYANIZUM Nyl. in Cromb. Challng. Exped. p. 227.

L. cyanescens Nyl. Syn. p. 131.

On tree trunk, Buitenzorg; No. 33.

Spores globular and ellipsoid with a thickened epispore, measuring 14–17 × 11–12 μ, or 11–12 μ for the globular ones. Asci ventricose, the apical wall thickened, eight-sporous. Algae Nostoc.

Previously reported from Nukahiva of the Polynesian Islands, and from New Caledonia.

BAEOMYCES CRENULATUS (Mont.) Hepp in Zoll. Verg. pp. 5 and 7.

On earth, West Java; alt. 1500 m. No. 29.

Thallus sordid-whitish, granulate. Stipes very short (1–2 mm.). Apothecia 3–5 mm. in diameter, plane or slightly convex, the margin more or less crenulate, at length excluded. Spores simple, blunt-fusiform, 10 × 3 μ, diagonally and serially arranged in clavate asci.

The species seems very near *B. byssoides*.

Never collected elsewhere so far as ascertained.

STEREOCAULON TURGESCENS Nyl. Syn. p. 240.

On earth, Aloen-Aloen, Kandang-Badak, and Tjipanas; alt. 2000–2900 m. Nos. 5, 2, 9 and 13.

Podetia simple or branched, when branched having much the aspect of *S. denudatum*. Apothecia juvenile, containing no asci or spores.

Previously collected in Java, and credited to West Africa.

STEREOCAULON CORALLOIDES Fr. Sched. Crit. IV, p. 24.

On earth, Tjipanas; No. 23.

Juvenile plants, but quite characteristic.

STEREOCAULON NESAEUM Nyl. Syn. p. 240. Sub *S. mixtum*.

On thin earth over rocks, Aloen-Aloen and Kandang; Nos. 20 and 26.

Podetia elongated, erect, unbranched or scarcely branched. Phyllocladia prolonged into fibrils. Spores acicular, 87 × 5 μ, multiseptate. Cephalodia 2–7 mm. in diameter, plicate-corrugate, blue-brown or flesh-colored, often developing on the ends of the shorter fibrils.

Reported from the Philippines, and other Pacific islands.

CLADONIA PITYREA var. CARNEOPALLESCENS Nyl. in Flora, 1866, p. 129.

On earth, Aloen-Aloen; alt. 2900 m. No. 14.

Reaction K−. The apothecia rufous or variegated in the mature plant.

No record discovered except for Java.

ROCCELLA MONTAGNEI (Bel.) Darbish. Mon. Roccell. p. 24.

On rocks, Batavia; No. 28.

Without apothecia. Widely distributed in the tropics.

ROCCELLA FUCIFORMIS (L.) DC. Fl. Fr. II. p. 335.

On rocks, Batavia; No. 28.

Without apothecia.

RAMALINA YEMENSIS (Ach.) Nyl. Mon. Ram. p. 46.

On trees, Tjipanas; alt. 1000 m. No. 6.

Laciniae narrow, but entirely characteristic.

Confined to subtropical regions and the Southern hemisphere.

USNEA TRICHODEA Ach. Method. p. 312.

On trees, Tjipanas; alt. 1000 m. No. 24.

USNEA **florida** var. **Sorediata** (Kremplh.) Merrill comb. nov.

On trees, Tjipanas; No. 4.

The main branches more or less reddish and nearly efibrillose.

USNEA FLORIDA var. STRIGOSA Ach. Method. p. 310.

On trees, Tjipanas; Nos. 8 and 24.

No. 24 with radiately-fibrillose apothecia.

USNEA ARTICULATA (L. Hoffm.) Hoffm. Deutsch. Fl. p. 135.

On trees, Aloen-Aloen and Kadang; alt. 2900 m. No. 1.

Beautifully characteristic but without apothecia.

PLATYSMA CITRINUM (Tayl.) Nyl. Syn. p. 304.

On tree trunks, Aloen-Aloen and Kadang; alt. 2900 m. Nos. 10, 12 and 21.

Spores ellipsoid, simple, 5–6 × 3 μ, asci ventricose-oblong.

Platysma glaucum (L.) Nyl. Prod. p. 49.
On trees, Pangerango; alt. 2700 m. No. 15.
Without apothecia.

Parmelia pertusa (Schrank.) Schaer. Lich. Helv. Spiclg. II, p. 457.
On trees, Aloen-Aloen; No. 22.
The edges of the laciniae more or less denigrate.

Parmelia physodes (L.) Ach. Method. p. 250.
On bark, Bintang; No. 18.
Peculiarly combining the characters of the species *P. enteromorpha* and *P. vittata.*

Parmelia laevigata (Sm.) Ach. Syn. p. 212.
On small branch of a tree, Aloen-Aloen; alt. 2900 m. No. 27.
Without apothecia.

Parmelia perforata Ach. Method. p. 217.
On trees, Bintang; alt. 1500 m. No. 17.
Apothecia imperforate, the exciple strongly scrobiculate-rugose.

Parmelia olivaria forma cetrarioides (Del.) Merl. in Bryologist, XI, p. 95.
On trees, Tjipanas; No. 7.
Reaction K ±, K(C) + distinct red for the medulla.

Theloschistes flavicans (Sw.) Norm. Conat. Gen. Li. p. 17.
On trees, Tjipanas; alt. 1000 m. No. 3.
Without apothecia.

Physcia (Pseudophyscia) hypoleuca var. dendritica (Pers.) Hue Lich. Ex. Eur. I, p. 113.
On trunks, Aloen-Aloen; No. 25.
Densely rhizinose-squarrose beneath.

Sticta (Stictina) Mougeotiana var. xantholoma Del. Stict. p. 63.

On twigs, Aloen-Aloen; No. 25.

Without apothecia. A tropical species of which very little is known.

The var. *aurigera* of *S. Mougeotiana* also credited to Java by Nylander.

STICTA (STICTINA) CROCATA (L.) Ach. Prod. p. 158.

On rocks. Aloen-Aloen; alt. 2900 m. No. 11.

Without apothecia.

STICTA DAMAECORNIS (Sw.) Ach. Method, p. 276.

On trunks, West Java; alt. 1500 m. No. 30.

Without apothecia.

ROCKLAND, MAINE.

SHORTER NOTES

A TETRACARPELLARY WALNUT. The curiously malformed walnut shown in the accompanying sketches was found in a lot of walnuts purchased in Pittsburgh, about the time of the publication of Wm. H. Lamb's note on "A Tricarpellary Walnut"

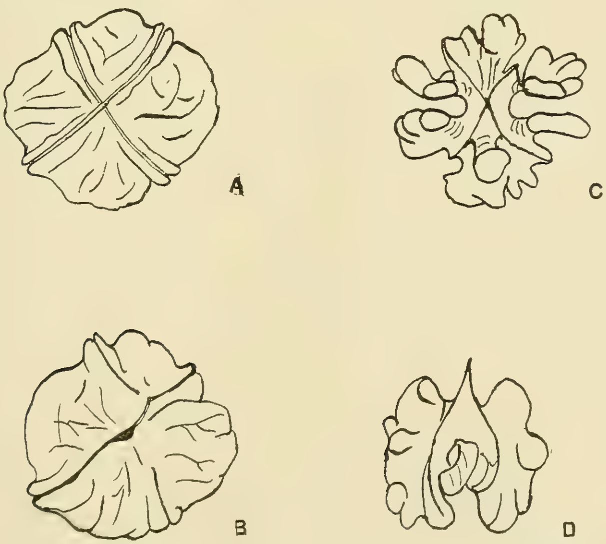

FIG. 1. A tetracarpellary walnut. *A*, Front or pointed end. *B*, Back or rounded end. *C*, Front view of kernel. *D*, Top view of kernel.

(TORREYA 12: 290–291. 1912). The writer's attention was called to the latter paper by Dr. O. E. Jennings, of the Carnegie Museum, when the specimen was shown to him. The specimen differs from that described by Lamb in that the shell is divided into four, instead of three parts. In the sketch, *A* is a view of the shell from the front or pointed end, and *B* the back or rounded end. It will be noticed that the division of the shell is not symmetrical, no two portions being quite the same size, and also that the minor or secondary fissure (the one extending upwards from left to right in *A*) is not complete at the back of the shell. *C* is a view of the kernel, in the same position as the shell in *A*, and *D* is a top view of *C*. The malformation appears to have affected the appearance of the shell more fundamentally than that of the kernel. The specimen is now in the possession of Dr. Jennings at the Carnegie Museum, Pittsburgh.

Since the above paragraph was written, a number of abnormal walnuts have come into the possession of the writer. Of these, three showed division of the shell into four parts, as seen from the point end, while seven showed division into three parts at this end. Of these seven, however, three showed division into four parts, almost symmetrically, at the rounded end, and there seemed to be a tendency for the nuts to be unsymmetrically tricarpellary,—that is, the shell is divided into two equal halves by a continuous fissure, and then one of these halves again divided by a fissure at right angles to the first. Of these ten abnormal walnuts, two were found in the open stock of a local grocery store, one of these two being tricarpellary, and the other tetracarpellary. The remaining eight came from a grove in Santa Ana, California, and represented apparently somewhat less than one per cent. of this particular lot of nuts from this grove. One of these eight was unsymmetrically tetracarpellary, while the rest were either symmetrically or unsymmetrically tricarpellary. In addition to the above, several walnuts were found in which the normal grooving of the shell was deepened in certain directions as seen from the rounded end, most of them showing a tendency to divide into four approximately equal parts. One specimen showed an unsymmetrical division of the shell into

two portions, by two half fissures at an angle to each other, one part of the shell representing about one-third of the whole, and the other the remaining two-thirds, as though the tricarpellary development had not been completed.

F. ALEX. MCDERMOTT.

PITTSBURGH, PA.

REVIEWS

Coker's Plant Life of Hartsville, South Carolina*

Although South Carolina was the home of some of the most noted southern botanists of the ante-bellum period, and the scene of much good work by transient collectors as well as by residents in the early days of American botany, when plants were always studied singly, without reference to their associations and environment, it has been sadly neglected by students of the modern science of plant sociology; and fewer descriptions of vegetation have been published for that state than for almost any other in the South. The only paper on South Carolina vegetation at all comparable with the one before us is one by the same author on the Isle of Palms (Charleston County), published about seven years earlier.†

The present paper is a rather detailed study of the vegetation of the immediate vicinity of the town where the author was born and where he has spent many of his vacations since becoming a professor of botany in another state. The area covered does not seem to have any definite boundaries, natural or otherwise. The following condensed outline of the work (which has no table of contents) will indicate its scope about as well as several sentences would.

Introduction (history of exploration) 3–4
Climate 4–7
Topography and geology 7–8

* The plant life of Hartsville, S. C. By W. C. Coker, Ph.D., Professor of Botany, University of North Carolina. 129 pp., 15 plates. $6\frac{1}{2} \times 10\frac{3}{8}$ in. Printed at Columbia, S. C., for the Pee Dee Historical Association, [December] 1912.—Pages 3–38, with the plates, originally published in Jour. Elisha Mitchell Sci. Soc. 27: 169–205, *pl. 1–15*. 1912. (Misprinted "Vol. XXVIII, December, 1911.")

† TORREYA 5: 135–145, *f. 1–4*. Aug. 1905.

The numbers in this synopsis refer to the pages of the complete edition. The first 38 pages correspond with the part printed in the Elisha Mitchell Journal, but the wording is not identical in both editions, the author having made a few corrections in the months intervening between the two printings.

Hartsville is in Darlington County, in the upper part of the coastal plain, about 80 miles from the coast and 15 or 20 from the fall-line. According to Dr. Coker it is just at the coastward edge of the fall-line sand-hill belt. The soils in that neighborhood are mostly sandy, with little mineral plant food, and rocks, especially limestone, are conspicuous by their absence. The streams are not muddy, and the location of a paper-mill there (mentioned several times in the text) is probably correlated with the comparative freedom of the water from mineral substances in suspension or solution.

The mean temperature (deduced mainly from the records of two stations in the same county) is about 61.5° F., and the average annual rainfall about 48 inches. About 36.6 per cent. of the total precipitation occurs in the three warmest months, June to August, and 44.7 per cent. in the four warmest months, June to September. (This preponderance of summer rainfall—

which the author does not comment on—seems to be characteristic of all the sandier parts of the coastal plain of the southeastern United States, and it must have an important influence on soil and vegetation.*

The descriptions of vegetation seem to have been written more for the benefit of the intelligent citizens of Hartsville than for the scientific public, for they contain very few generalizations, or comparisons with other parts of the world. A number of particular spots, many of which have been considerably altered by civilization, are described in a sort of narrative style (as was customary in most of the pioneer descriptions of vegetation, a generation or so ago), without any tabulation, or summation of the salient features of the vegetation of each habitat. However, the inconvenience of having the names of plants scattered through the text in no particular order is partly offset by the index, which seems to be nearly complete.

The sand-hill vegetation, the first type described, is evidently much like that of the rest of the fall-line sand-hill belt from North Carolina to Georgia, of which almost no ecological descriptions had been published before.† Under this head there are some valuable notes, partly compiled and partly original, on the relations of fire to the dominant tree of the sand-hills, *Pinus palustris*.

The upland forests of slightly richer soils differ from those of the sand-hills in having more shade and humus, and many more species of trees. The author calls especial attention to the scarcity of conspicuous spring flowers in these forests: a feature which is also characteristic of the hammocks of Florida and of many other places where the soil is sandy and poor in soluble minerals and the summers are wetter than the winters, and has been commented on by many visitors to such regions coming from places where different conditions prevail.

The "flatwoods" resemble the flat pine-barrens nearer the coast in many ways, and the "savannas" seem from the descrip-

* See Bull. Torrey Club 37: 415–416 (footnote). 1910.

† Some of the commoner or more conspicuous plants of this belt have been listed in Bull. Torrey Club 37: 412–413. 1910; 38: 224–225. 1911.

tion to be much like the cypress ponds farther south, having more trees and perhaps more water in them than the typical savannas of eastern North Carolina and tropical America.

A "bay"* may be defined roughly as a two-storied forest growing in permanently saturated soil, with a large proportion of evergreens in the lower story, which is usually denser than the upper. Dr. Coker notes the resemblance of his bays to the pocosins of eastern North Carolina, and divides them into two classes, differing considerably in vegetation; namely, flatwoods, or stagnant bays, and "alluvial" or drained bays. His application of the term *alluvial* is somewhat at variance with ordinary usage, and his "alluvial bays" are very similar to some of the *non-alluvial* swamps of the coastal plain of Georgia and Florida.

The absence of muddy (alluvial) swamps characteristic of large fluctuating streams is commented upon. The creek-swamps are much like those of the Altamaha Grit region of Georgia. The "lakes" and ponds are all artificial, and therefore have little geographical significance, but the plants growing in them are nearly all indigenous somewhere in the coastal plain, if not in that immediate vicinity.

The list of 52 "native trees" includes some large shrubs like *Alnus*, *Sassafras*, *Prunus angustifolia*, *Cyrilla* and *Kalmia*, and some doubtfully indigenous species like *Populus deltoides*, *Juglans nigra*, *Celtis Smallii*, *Morus*, *Sassafras*, *Platanus*, *Prunus serotina*, *P. angustifolia*, *Gleditsia*, *Diospyros* and *Catalpa;* but at the same time the author shows a commendable conservatism in relegating to the list of cultivated trees *Juniperus*, *Fagus*,† *Quercus laurifolia*, *Ulmus alata*, *Prunus caroliniana*, and *Chionanthus*, which are believed to be native not many miles away. In the list of native trees just one fourth of the species (six conifers and seven angiosperms) are evergreen; and the proportion would be somewhat larger if the doubtful species above

* The use of *bay* as a term in plant sociology seems to be strictly confined to the coastal plain, like *hammock* and *pocosin*.

† It is very interesting to know that the beech is absent from the Hartsville neighborhood, as it is from the Altamaha Grit region of Georgia, which has equally sandy and sour soils. See Bull. Torrey Club **32**: 147. 1905; TORREYA **6**: 199; Ann. N. Y. Acad. Sci. **17**: 106, 330. 1906.

mentioned were excluded, and very much larger if the vegetation were analyzed quantitatively instead of qualitatively. (Evergreens, both coniferous and broad-leaved, in temperate and moderately humid climates at least, seem to be especially characteristic of coarse or poor or sour soils.)

The taxonomic catalogue, which makes up nearly half the book, includes 628 species of pteridophytes and spermatophytes, native and naturalized. Less than 20 per cent. of the angiosperms are monocotyledons, which is a striking confirmation of the statement in a footnote on page 62 that the list is not complete for grasses and sedges. (Only three species of *Cyperus*, four of *Rhynchospora*, and one of *Carex* are enumerated.) Most other parts of the coastal plain seem to have about 30 per cent. of monocotyledons in their angiospermous flora.*

In nomenclature (and classification) Dr. Coker has followed as far as possible the seventh edition of "Gray's Manual," because it is "the most available [*sic*] and conservative book." As his locality is about 150 miles south of the territory covered by the Manual, there are many species and even genera in his flora which are not included in that book, and he has been led into many nomenclatorial inconsistencies by trying to follow it and the current southern floras at the same time. In attempting to reduce the number of these inconsistencies he has made one new combination, *Euphorbia exserta* (of which systematists will take due notice), and suggested another, *Oenothera arenicola*. (Both of these species were originally described by Small under genera which have never been recognized by Gray and his direct successors.)

There are a few cases where species seem to have been wrongly identified. *Arundinaria macrosperma*, characteristic of the banks of large muddy southern rivers, is hardly to be expected in that kind of country, the "*Nymphaea advena*" is probably one of the floating-leaved species, the "*Euphorbia maculata*" of the sand-hills is probably *E. cordifolia* (for *E. maculata* is a typical roadside and railroad weed), and the "*Viburnum cassinoides*" may be *V. nitidum*.

* See TORREYA 5: 207–210. 1906; 11: 41. 1911; 12: 224. 1912.

More interesting is the case of the cypress. Dr. Coker avoids mentioning the technical name of this tree in the first 33 pages, and then in the four places where he does designate it specifically he calls it *Taxodium distichum.* On page 44 he implies that the only difference between our two eastern species (or varieties, as some still prefer to call them) of *Taxodium* is in the leaves; thus completely ignoring the differences in bark, buttresses and habitat pointed out by the reviewer in one of our best-known botanical journals in 1902 and 1905. The tree shown in his plate 12 is easily identified by its bark and surroundings as *T. imbricarium* (or *T. adscendens*, according to the Vienna rules of nomenclature); and one cannot be certain from his descriptions of the vegetation that typical *T. distichum* occurs there at all.

The notes on the distribution of each species average not more than two lines each. Assuming the index to be complete, it appears that over 40 per cent. of the species listed are not mentioned in the ecological part of the work, so that we are given very little information about their habitats and associations. Many of these 40 per cent., however, are weeds, which the author did not undertake to classify by habitat.

This work, especially the systematic part of it, is one of many recent examples that go to show how few people there are in the world at the present time who can write about a large number of plants and name them all correctly. The accurate determination of plants seems to be gradually becoming a lost art, and botanical text-books have almost ceased giving instructions in it. The ranks of the systematists are being decimated by desertion and death, and there are very few new recruits these days. (Even the present reviewer, who used to be primarily a systematist, has lost interest in nomenclatorial refinements, and now cares little for minute specific characters which are not visible from a moving train.) ROLAND M. HARPER.

Blakeslee and Jarvis' Trees in Winter*

The title Trees in Winter suggests for the book under con-

* A. F. Blakeslee and C. D. Jarvis, Trees in Winter: Their Study, Planting, Care, and Identification, pp. 1–466. [Illust.] The Macmillan Company, New York. Price $2.00.

sideration a more limited field than it really includes. The subtitle, "Their Study, Planting, Care, and Identification," seems at first sight to contain an incongruity when considered in connection with the first part of the title. It would appear that either the book is concerned with a peculiarly limited phase of tree study, or else that its field is unevenly distributed, and poorly defined by title. The writers are, however, able fairly well to harmonize the contents with the title by pointing out that the proper time to plant and care for trees in early phases of their activity is during the months in which they are in their winter condition. So that the title might perhaps be changed advantageously to "Trees in their winter condition," etc., or something similar.

But if the title is somewhat inadequate, fault can hardly be found with the contents on this score. The book consists of two parts, the first on the planting and care of trees, and the second on their identification. The second part is practically the same as the bulletin on the same subject issued by the writers in 1911 from Storrs Agricultural Station, Conn. The only differences are in the way of additions and some amendments to the keys, etc.

Part I is stated to have been "written primarily for the individual and his home grounds." That it succeeds admirably in this purpose may be judged from a remark of a non-botanical friend of the reviewer, who on looking the book over, suggested that "it was a book which tells an ordinary person the things he wants to know about trees." That the writers had this purpose clearly in mind is shown in a later discussion under the topic, "Tree study in High Schools and Colleges" as follows: "Too frequently we forget that the student and the student's view-point are of more importance than botany and the botanist's view-point" (page 25).

The possession of this view-point is a prime necessity for any book which asks consideration from the general reader or for use as a textbook. Many textbooks have been written and are still appearing which serve not so much to interest and instruct the pupil as to present the individual point of view of the author.

Such books can have but one good *raison d'etre,* that of genius. Lacking this they are commonplace.

As suggested in a preceding paragraph, the authors of Trees in Winter ask consideration of their book both from the general reader, and as a textbook for use in high schools and colleges. In connection with the latter purpose they give a number of suggestive methods by which it can be used in teaching. They emphasize the necessity of careful planning in preparation for field trips, and of requiring some kind of report of trips from each pupil. A method by which the pupils are to compete in learning to recognize different kinds of trees is also described. Under the topic "Student collections" (page 28), the question of requiring students to collect and identify one hundred or so specimens as part of a tree course is objected to as requiring "an unduly large amount of mechanical labor in proportion to the results obtained."

The book appeals to the reviewer as a practical teachable book. To be used successfully, however, the classes should not be very large. It is probably best adapted for use with college classes, or perhaps with small classes of high-school pupils, especially in the country or small towns. Its use except as reference for the large classes in city high schools is undoubtedly impractical owing to the large number of pupils per instructor.

The scope and method of the first part can best be made clear by noting the chapter topics which are as follows: I.—Structure, life, and growth of a tree; II.—The propagation of trees; III.—Tree planting in rural districts; IV.—Tree planting in towns and cities; V.—The selection of trees for special purposes; VI.—How trees are planted; VII.—The care of trees; VIII.—Common injuries to shade trees; IX.—The control of parasites; X.—Insecticides, fungicides, and spraying.

These topics are treated in a clear and readable way. For example, under Chapter VIII, the writers discuss the sources of injuries to trees, as wires, grading, pruning, etc., also tree surgery, "dehorning," filling cavities, and bolting and chaining. Under Chapter V are such topics as Trees with showy flowers,—Blooming before or with the leaves,—Blooming after the leaves,—

Columnar or very tall trees,—Trees resistant to smoke,—Trees best adapted to calcareous soils,—Fruit trees,—etc., etc. Under Chapter III are discussed such topics as The conservation of good scenery,—Sign boards must go,—The problem of the country roads,—Planting for winter effect,—Planting plan,—The finished picture.

The book is well illustrated mainly with half-tones designed to make clear the text. The illustrations include pictures of tree groups and of single trees, of tools and of methods of using them, of planting plans and of methods of tree propagation, of tree pests and of caring for injuries. One discrepancy between text and illustration was noted. On page 51, under the topic "Care of seedlings," a method of shading seedlings is described with reference to figure 28 as illustration. This figure, however, proves to be a picture of a "stick of buds" for grafting purposes. Probably there may be discovered other discrepancies of this sort as well as errors in spelling overlooked in proofreading, but such errors are certainly not numerous, and the present writer does not believe that a review is the place to publish a list of errata as is often done.

Part II on the "Identification of trees" is, as already noted, like the Connecticut Agricultural Experiment Station bulletin which has already been briefly reviewed in TORREYA (Feb., 1912) by Taylor. For those who may not have seen that review, it may be noted that Part II consists of the following parts: Explanation of terms; Key to genera and species; based on bud, scar, and leaf characters, and finally the descriptive portion. In the last-mentioned portion, each species is given two pages, one of fine print descriptive of habit, bark, twigs, leaves, buds, fruit, with "comparisons," distributions, and wood description; the other page is devoted to half-tone illustrations of whole tree, bark, fruit, and twig. The descriptions appear to be adequate and the illustrations are well chosen. Both native and commonly cultivated species are described.

In conclusion the opinion may be expressed that this book is one which will meet with very general approval, and that the

authors have been successful in the task which they set themselves.

RALPH C. BENEDICT.

HIGH SCHOOL OF COMMERCE,
NEW YORK CITY.

PROCEEDINGS OF THE CLUB

MARCH 11, 1913

The meeting of March 11, 1913, was held at the American Museum of Natural History at 8:15 P.M. Dr. E. B. Southwick presided. Ten persons were present.

The minutes of February 26 were read and approved. The announced scientific program consisted of a lecture on "Agriculture among the American Indians," by Dr. A. B. Stout.

The subject was presented from the viewpoint of popular economic botany. As an introduction, several views of typical Indian mounds were shown and a general discussion given of the extent of Indian life in America, especially in the area now embraced by eastern United States. The point was made that the so-called "mound-builders" were none other than the ancestors of the present Indians of the United States and that the domestication of all endemic plants which were in cultivation in America at the time of the discovery of the new world was the result of Indian agriculture. Views were shown of Indian cornfields and garden beds as they appear today after having remained undisturbed since the Indians raised the last crop on these fields. The conspicuous hills of the former and the long parallel ridges of the latter reveal the methods of planting of various field and garden crops. The most important plants which were cultivated by the American Indians were briefly described and illustrated by lantern-slides, their uses given and mention made of their importance in the agriculture of today. Some archeological and historical data were given regarding the origin of these plants and the extent to which they were cultivated.

The principal plants thus considered were as follows: Indian corn, the agaves, tobacco, potato, tomato, Jerusalem artichoke,

manihot, sweet potato, yautia, pumpkins and pumpkin-gourds, beans (*Phaseolus vulgaris* and *P. lunatus*), pecan, American plums, red-pepper, cinchona, quinoa, pineapple, Chilian strawberry and wild rice.

Besides these, mention was made of certain important food plants of ancient America which were also in cultivation in prehistoric time in Polynesia and Asia. A general summary of the 250 most important plants cultivated on a considerable scale in the fields, gardens, and orchards of the world shows that about 50 originated in the new world through domestication by Indians. The story of Indian agriculture is the story of America's contribution to the food, fiber and drug products that make for the welfare of mankind.

Meeting adjourned.

F. D. Fromme,
Secretary pro tem.

NEWS ITEMS

At the recent meeting of the National Academy of Arts and Sciences held in Washington, D. C., Dr. Erwin F. Smith was elected a member. It is reported in the daily papers that Dr. Smith has declined a $10,000 position with the Rockefeller Institute for Medical Research to retain one at $4,000 a year with the Government, but there is no official confirmation of this matter.

Dr. E. L. Morris has returned from Arizona where he has been collecting material for a museum exhibit illustrating desert vegetation. He has spent considerable time in the Tucson Mountains getting photographs and plaster models of cactuses and other xerophytic plants.

Through the coöperation of the Bermuda Natural History Society and Harvard University, the Bermuda Biological Station for Research will be open this summer as usual for about six weeks, from the middle of June till August. Botanists or zoölogists wishing to avail themselves of this opportunity should communicate with Dr. E. L. Mark, 109 Irving St., Cambridge, Mass.

The Wild Flower Preservation Society, in coöperation with the New York Botanical Garden are publishing in the *Journal* of the latter institution a series of colored plates illustrating native plants in need of protection. Several of these have already appeared and more are to follow. They are being reprinted as pamphlets and these may be had for schools and by individuals by applying to Mrs. E. G. Britton who has charge of the enterprise.

During the months of July and August the facilities of the Seed Laboratory of the Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C., will be available as far as space permits to any one who wishes to consult the seed collection and become familiar with the practical methods of seed testing for mechanical purity and germination. For further information address Mr. E. Brown, botanist in charge.

The Rev. Leander Trowbridge Chamberlin, D.D., died at Pasadena, Cal., on Friday, May 7. He was the author of many books and for some years a member of the Torrey Club. At the initial publication of this journal he was much interested in its success and offered financial help to the undertaking. He resigned from the club a few years ago.

Dr. Chas. S. Ridgway has resigned as assistant professor of botany at the Alabama Polytechnic Institute, to accept an appointment in the Bureau of Plant Industry at Washington.

The Torrey Botanical Club

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their papers appear, will kindly notify the editor when submitting manuscript.

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W. A. MURRILL

Delegate to the Council of the New York Academy of Sciences,

WILLIAM MANSFIELD

*Died February 1, 1913.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

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(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 39 published in 1912, contained 630 pages of text and 45 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are, agents for England.

Of former volumes, only 24–37 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–39 three dollars each.

Single copies (30 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–13 are now completed; Nos. 1 and 2 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

DR. BERNARD O. DODGE
Columbia University
New York City

Vol. 13 July, 1913 No. 7

TORREYA

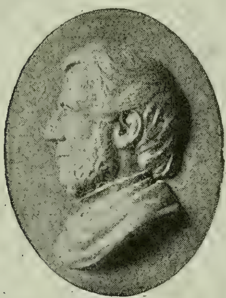
A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR



JOHN TORREY, 1796–1873

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THE TORREY BOTANICAL CLUB

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Matter for publication should be addressed to

NORMAN TAYLOR
Brooklyn Botanic Garden
Brooklyn, N. Y.

TORREYA

July, 1913.

Vol. 13 No. 7

ARE THE SPECIES OF RHIPSALIS DISCOVERED IN AFRICA INDIGENOUS?

By R. Roland-Gosselin*

There have been several species of *Rhipsalis* described, from the African continent, from Zanzibar, Madagascar and the Mascarene Islands. Most of these exist living in our collections and it has now become possible, after a comparative study, to form an idea as to their being indigenous or imported, by way of the ocean, from America.

I have possessed for fifteen years adult examples of all of Weber's species, with labels written in his handwriting, by the aid of which I feel able to make careful comparisons on account of the authenticity of his types.

Weber described in the Revue hort. 1892:

Rhipsalis madagascariensis.
suareziana.
comorensis.
zanzibarica.

K. Schumann described (Monogr. Cact. p. 603):

Rhipsalis erythrocarpa.

Welwitsch described a *Rhipsalis aethiopica* from Angola, and Commerson found on the island of Mauritius *Rhipsalis mauritiana* and *fasciculata* Haw.

If to this list we add *Rhipsalis Cassutha* Gaertn. which is as common in Africa as in America, and which has also been collected in Asia at Ceylon, I shall have mentioned all the species of *Rhipsalis* actually known in the flora of the Old World.

* Bull. Soc. Bot. France 59: 97–102. 1912. Presented January 12, 1912. Translation by E. G. Britton,

[No. 6, Vol. 13, of Torreya, comprising pp. 121–150, was issued 9 June 1913.]

Four of these must be regarded as synonyms of *Rhipsalis Cassutha* Gaertn. They are:

Rhipsalis aethiopica Welwitsch.
mauritiana Commerson.
zanzibarica Weber.
comorensis Weber.

This fact is not contested by anyone for the first two species. As Weber describes it, his *R. zanzibarica* sent from Zanzibar to the Museum in 1888 by Father Sacleux is also a form of *R. Cassutha* but very vigorous and identical with a fine specimen collected at Xalapa, Mexico, by M. Leon Diguet in 1907, bearing fruits somewhat elongated as in *R. zanzibarica.* In a large number of specimens of *R. Cassutha* from different localities the fruits may be seen quite spherical.

Rhipsalis comorensis, in which the flowers, fruits and seeds are like those of *R. Cassutha*, is distinguished by the vegetative parts being slightly thickened. The branches are not very long and consequently less pendent. The young specimens have the aspect of *R. conferta* S. D. but the flowers are completely different.

Weber in the "Dictionnaire de Bois," p. 1046, considers his *R. madagascariensis* as a synonym of the old *R. fasciculata* Haw. indicated by P. de Candolle and Lamarck as originating in Sto. Domingo and adjacent islands.

The figures given by the Botanical Magazine (no. 3079) and by Redouté in the Plantes Grasses of P. de Candolle represent the American plants, identical with those specimens from Africa which we possess. According to their origin these vary in size. The type of Tamatave which Weber used for his description is slender and sometimes languishes in our green-houses, whereas the one introduced from Madagascar by Sainte-Marie in 1898 is larger and more robust. This species preserves its juvenile form during many years, the stems are covered with many small white setaceous spines; usually on the adult branches there arise juvenile branchlets bearing flowers. I do not know the authentic specimen from Mascarene Islands.

De Candolle believed that he recognized *Rhipsalis fasciculata*

in the figure of the manuscript of Plumier bearing the name "*Opuntia minima flagelliformis.*" Haworth mentions also this drawing but says: "figura vero Plumeri valde dissimilis," and he has very good reason. The species of Plumier is not *Rhipsalis fasciculata*, and could very well be the lost species, described by Pfeiffer, by the name of *undulata.*

The existence on the American continent of *Rhipsalis fasciculata* Haw. is not proven, and it is remarkably curious that it has not been found except on the Islands of America and Africa, near the sea in the latter part of the world.

Rhipsalis suareziana Web. which the author has denominated *suarensis* in the "Dictionnaire de Bois," is a very characteristic plant, belonging to a group having lateral inflorescence, with exserted ovary and branches of two forms. At the extremity of the branching, elongated cylindrical stems, which have spacious areoles and almost naked, there grow in a spiral series a large number of very short branchlets 4 or 5 together, with areoles crowded and setiferous, which are not floriferous, and do not produce buds for further ramifications. Weber has not described the flower except briefly in the Dictionnaire, and one very important character escaped him. The stigma is bifid, or in very rare exceptions 3–4-fid and this number of divisions cannot be frequent in the genus, for I have not observed it in other species.

At the same time that he described this African plant, Weber described (Rev. hort. 1892) a *Rhipsalis* of which he did not know the origin, but which we have since received from Brazil, under the name of *Rhipsalis tetragona.* In the Dict. de Bois. p. 1046 he indicates its resemblance to *R. suareziana* and described the flower as small and lateral with obovate recurved petals.

I should remark here that the plant described and figured in flower at Berlin by Gürke (Monat. für Kakteenkunde, 1908, p. 74) under the name of *Rhipsalis tetragona* Web. has not the least analogy with this species. The German plant belongs without doubt to the group of *Rhipsalis cribrata*, *R. Saglionis*, etc., with terminal, subcampanulate flowers, whereas Weber's species bears very small lateral flowers similar in all respects to those of

Rhipsalis suareziana. Furthermore, I found here also the bifid stigma which I observed on the plant of Diego-Suarez.

The more I observe and compare the two plants, the more firmly convinced I am that they belong to one and the same species.

I have failed thus far, in my researches, to find *Rhipsalis* (*Hariota*) *prismatica* Lem. from Brazil (Ill. Hort. 1863) which Weber supposed to be a synonym of his *Rhipsalis tetragona.* Lemaire's species seems to be absolutely lost.

Rhipsalis erythrocarpa K. Sch. (Monogr. Kact. p. 623) is a species from Kiliman-Djaro, described from dried specimens and not introduced into cultivation, belonging to the same class and close to *Rhipsalis Cassutha* and *R. virgata* Web.

Rhipsalis Lindbergiana K. Sch. (Monogr. Kact. p. 624), a Brazilian plant, is one of the same group and does not differ from *R. virgata* Web. except in the rose-color of its fruit. I believe that these two plants are identical specifically. Schumann was not opposed to this idea in his correspondence with Weber and was disposed to unite the two plants under *Rhipsalis virgata* of which they may constitute a variety or two on account of the difference in the relative size of the berries.

I have passed in review all the species of *Rhipsalis* from Africa. None are in my opinion indigenous to this part of the world, as all are found in the flora of America.

What modifications in nomenclature would the adoption of my opinion bring about?

Weber has settled the question for his *Rhipsalis madagascariensis* which he refers as a synonym to *Rhipsalis fasciculata* Haw.

Rhipsalis suareziana and *R. tetragona* Web. were published at the same time. I should prefer to keep the name of the American species which seems to be the stock or source of the plants of Diego-Suarez.

For the same reason the name *R. Lindbergiana* K. Sch. should be adopted and *R. erythrocarpa* of the same author becomes a synonym, unless in the future we are peremptorily obliged to consider these plants as varieties with red fruits of

R. virgata Web., this cannot be decided without the introduction of living plants.

Rhipsalis comorensis Web. and *R. zanzibarica* Web. become synonyms of *R. Cassutha* Gaertner.

How could the American species of *Rhipsalis* become *transported* to Africa? Evidently by migratory birds. I see here birds which devour the berries of *Rhipsalis* entire. They are small, very glutinous, full of a sweet pulp, in which are small seeds, variable in number according to the species. They are not dehiscent, but at the end of two years decay and fall off at the least contact. When *Rhipsalis* is situated where small birds have access to it, it is stripped of its fruit as soon as they ripen.

We can admit at first sight the function of the intestines in the propagation of seeds. We have seen seeds of figs deposited on the summits of date-palms, where they root in the earth which collects in the axils of the leaves. The coat of the seeds in *Rhipsalis* has a hardness analogous to that of the seeds of *Ficus Carica*. The birds could also carry the seeds on their feet or on their feathers, where they would adhere for a long time. The berry, half rotten, very readily caducous, could also attach itself entire to any object which it touched.

It is to be noted that no species of the group of flat-jointed *Rhipsalis* (*Alatae*) has been found in Africa and that the species of this group almost all have the seeds very fragile. The pulp of their berries is generally not very adhesive. These two characters render very dubious their arrival in good condition after the long journey across the Atlantic.

No botanist has ever doubted the importation from America of the *Opuntias* which are naturalized throughout Central Europe, also in all of Africa and in certain Asiatic regions. No *Opuntia* found in the Old World has received the honor of a specific name.

It seems very plausible that this genus also has been propagated or distributed by birds having scattered the seed which have very bony hard coats and are very durable.

Larger animals and man himself have contributed largely to the distribution of these plants, of which the fruits are edible, if not all of good quality.

[M. Roland-Gosselin's bold explanation of the occurrence of these *Rhipsalis* species of Cactaceae in tropical Asia and Africa, the family being otherwise American in distribution, is an important contribution.—N. L. B.]

A CASE OF ABNORMAL DEVELOPMENT OF A SHORT GROWTH IN PINUS EXCELSA

By Arthur H. Graves

The characteristic development in the genus *Pinus* of two sorts of shoot axes—long and short—is well known to all who are acquainted with the genus. The long growth (*Langtrieb*) is represented by the main axis or axes of the shoot system; the short growths (*Kurztriebe*) consist of much abbreviated branches which are borne on the long growth, arranged spirally upon it, and subtended by its scale-like leaves. These short growths or branches are characterized primarily by the fascicles of leaves they bear; each one, in the group of the white pines, developing normally five leaves, in a whorl-like cluster or "fascicle." Microscopical examination shows near the base of these leaves, and surrounded by them, a tiny growing point at the terminus of the short growth. Under ordinary conditions this growing point never develops further; and at the end of two or two and one half years the whole short growth is shed, in essentially the same manner as a leaf is cast from one of our deciduous trees.

Under special conditions, however, as for example when the growing point of the long growth is injured, a development of a short growth into a long growth rarely occurs.* An interesting case of this kind was recently found by the writer on a tree about 15 years old of *Pinus excelsa* Wall. in the New York Botanical Garden, and is illustrated in figure 1. The five leaves composing the original fascicle may be seen at the base of the shoot, one of them having been slightly twisted in order to show

* Engler, A., und K. Prantl. Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten insbesondere den Nutzpflanzen. 2^1: 29 note. Leipzig. 1889.

FIG. 1. Photograph, showing abnormal development of short growth into long growth in *Pinus excelsa* Wall. About ¾ nat. size.

the latter to better advantage. It is quite evident that the shoot has developed from the growing point of the short growth, which, as above stated, normally atrophies and dies. The cause of this abnormal development is probably to be looked for in the dying out, due to injury of some sort, of the growing point of the long growth. All that remains of this may be seen in the figure as a small prominence to the left of the base of the original leaf fascicle.

It was asserted above that this phenomenon is a rare occurrence, a statement which should perhaps be qualified by adding that it is rare in trees older than the seedling stage. For the writer has seen not only buds develop at the terminus of the short

growths in especially vigorous two or three year old white pine (*Pinus Strobus* L.) seedlings, in the nursery of the Yale Forest School; but also fully formed shoots, which, judging from the five leaves at their base, have clearly developed from such short growth buds.

Professor J. W. Toumey, of the Yale Forest School, states that he has seen, in the vicinity of New Haven, a large tree of *Pinus Strobus* L., which, as a result of some kind of injury, had developed a considerable number of its short growths into long growths.

Pinus excelsa Wall., from which the shoot illustrated was taken, is also a member of the white pine group. It is commonly known as the Bhotan pine, and is a native of the Himalayas. As far as the writer can ascertain, the abnormality under discussion has not been before recorded for this species. According to Penzig,* however, the phenomenon has been noted in *Pinus sylvestris* L. by several observers.

Yale University,
New Haven, Conn.

THE DISTRIBUTION OF MACROCYSTIS PYRIFERA ALONG THE AMERICAN SHORE OF THE STRAIT OF JUAN DE FUCA

By George B. Rigg

Setchell and Gardner† report *Macrocystis pyrifera* as extending northward "up to the Strait of Juan de Fuca" and state that "It does not seem to be plentiful in Puget Sound itself." They report a specimen collected by Gardner from the west coast of Whidby Island. Dr. Gardner states in a letter to the writer, that this was a floating specimen and that he did not find this species growing on the coast of Whidby Island.

Saunders,‡ in speaking of the distribution of this kelp in

* Penzig, O. Pflanzen-Teratologie 2: 497. Genoa. 1894.

† Setchell, W. A., and Gardner, N. L. Algae of Northwest America, University of California Press. Berkeley, 1903.

‡ Saunders, De Alton. Harriman Alaska Series of the Smithsonian Institution, Vol. V.

Alaska says that it occurs "in the elittoral zone off rocky points and in unprotected places." Setchell and Gardner (loc. cit.) say that they "have never found it growing in over 12 or 15 fathoms of water."

During the summers of 1911 and 1912 the writer visited, in the course of his work as special agent of the United States Department of Agriculture, practically all portions of the American shore of the Puget Sound region along which the conditions are at all suitable for the growth of large kelps. He has not been able to find *Macrocystis* growing anywhere in Puget Sound proper or in the American waters of the Strait of Georgia, or among the San Juan Islands. That is, he has not found it growing anywhere inside of the Strait of Juan de Fuca. This agrees with Setchell and Gardner's report.

Along the American shore of the Strait of Juan de Fuca the writer found extensive beds of *Macrocystis pyrifera* extending from Low Point to Cape Flattery—a distance of about 35 nautical miles. Low Point is at the mouth of the Lyre river a short distance west of Port Crescent, Washington.

In practically all cases, the beds of *Macrocystis* border those of *Nereocystis* and are nearer shore and hence in a little shallower water than the beds of *Nereocystis*. The longest specimens found measured 40 feet. Since the plants so measured reached the surface even at high tide and no specimens were measured unless they included the holdfast, it is evident, that the plant does not in this region grow to a depth of water at all approaching the maximum reported by Setchell and Gardner. The writer has not found a statement as to the minimum depth of water in which this species grows.

In the course of investigating the kelps of the Pacific Coast as a source of potash fertilizer, interest has been focused largely on *Macrocystis pyrifera*, *Nereocystis luetkeana*, and *Pelagophycus porra* because these are the three largest species found in the region and are all provided with floats that keep them at the surface of the water so that they may be harvested by machinery on a large scale.

University of Washington

REVIEWS

Balls's Cotton Plant in Egypt*

The publication of Mr. Balls's book is of general interest in the world of plant breeding, since it gives the results of a very extensive series of experiments and represents one of the most general and efficient attempts at placing the breeding of an important crop plant on a Mendelian basis. Other investigators have done more extensive and intensive work on particular phases of Mendelism and on particular characters of other plants, but Balls has carried through a much more general campaign in the application of the Mendelian methods. The credit of the achievement should be all the greater because the work has been done under conditions that most investigators would consider very difficult. While the temperatures of the Egyptian summer are not so extreme as those that are encountered in our southwestern states, our pioneer conditions afford in other respects a more favorable atmosphere for experimental work than the vicinity of a large oriental city like Cairo.

Egypt might be described as a two-crop country, but the two industries are entirely separate. The tourist crop comes in the winter while cotton grows in the summer, when nobody stays in Egypt who can get away. The investigations of ancient remains, which have made Egypt so famous, are mostly conducted in the winter. This explains why the tourist literature of Egypt exceeds a thousand fold the cotton literature. But Mr. Balls is a tireless investigator, and at last we have one book about the Egyptian cotton that is not confined to statistics of production or to agricultural generalities.

That we do not get all that we might expect is no reason for being ungrateful for many new facts and suggestions of improved methods of investigation. It is in this latter field of methods that the work of Balls seems likely to be most appreciated. Certainly those who wish to employ all the physiological and statistical expedients for the elaboration of biological data will

*The Cotton Plant in Egypt, Studies in Physiology and Genetics, by W. Lawrence Balls, pp. 1–202, figs. 1–71. Published by MacMillan Co., 1912, price $2.50.

find in this volume an ample storehouse of examples and suggestions. In the absence of any adequate agricultural facilities, the author has carried through an immense amount of laboratory work and now makes a memorable contribution to his subject. The general factors, and especially the effects of light, heat and moisture in different stages of growth, receive detailed treatment and many significant relations are revealed.

To criticize the work because of a lack of agricultural conclusions would be entirely unfair, for the author shows everywhere a notable caution in claiming practical applications. If anything is to be criticized it is the methods that were followed in the breeding work, but even on this ground criticism would hardly be just, for the reason that these particular methods have had the highest approval in the scientific world during the period of Mr. Balls's work in Egypt.

Perhaps the most direct claim to definite results secured by the Mendelian methods of breeding is on page 119, which gives an account of the breeding of a short-styled variety, in order to lessen the danger of cross-pollination. Short-styled hybrids were secured by crossing the Egyptian cotton with American Uplands, and one of the hybrid strains is described as breeding true for five generations. But the undertaking was abandoned on account of the large number of "rogues" that continued to appear. The Mendelian inferences were preserved by ascribing the rogues to crossing, although the proportion of variants was higher than appeared in other experiments with natural crossing or even with artificial mixing of pollen. The conclusion was drawn that "the accessibility of the style [doubtless meaning stigma] is a minor factor in natural crossing, under the conditions of our breeding plot."

Nevertheless, this experiment seems to have led to a more careful study of the problem of natural crossing or "vicinism" as it is called, in which several interesting points were developed. That some of the results of crossing are greatly at variance with those that have come from similar experiments with Egyptian crosses in the United States, only makes them the more interesting as indications of unsuspected influences of external conditions

or varietal differences. Several of the disturbing factors of such experiments are recognized in Balls's analysis. One excellent point is that account must be taken of the number of seeds planted in such experiments, rather than of the plants that survive, for under adverse conditions only the hybrid plants may survive, so that incautious experimenters might report very high percentages of crosses. Indeed, Balls alludes to cases where only the hybrids survived.

One of the chief defects of modern Mendelian and statistical methods is seen when the book is considered as a record of botanical or biological observations. These methods often seem to keep the student from becoming acquainted with his plants or animals, doubtless because the numerical considerations absorb most of his attention, and leave comparatively little for observation of other features. Thus we read of "the apparent identity of all the modern varieties of Egyptian cotton in external appearance," and "the absence of differentiating characters, excepting for the lint itself," and other similar statements, which show that the experiments did not result in the kind of familiarity with the plants that is necessary for the most effective breeding work. The extensive contamination of the Egyptian crop with the so-called Hindi cotton also seems to have attracted very little notice. The striking morphological features of the dimorphic branches are passed with a casual reference. Of the same nature is the following statement on page 147:

"The F_1 of Aegypto-Upland crosses is always a superfine Egyptian. Thus, the mating of a 'bread-and-cheese' Egyptian with a short-staple Upland gives a first cross bearing such lint as is required by the fine spinner."

It is true that such hybrids usually yield lint superior in length and strength to that of the Egyptian parent, but it is a mistake to suppose that the hybrid lint is of the same quality as the Egyptian from the standpoint of the manufacturer. The "fine spinner" always distinguishes samples of such lint from the genuine Egyptian, and is more likely to take them for Sea Island or for extra-fine qualities of long-staple Upland than to recognize their Egyptian parentage.

With regard to problems of genetics the author's usual attitude is that of the professed and altogether convinced Mendelian. The Mendelian principles are supposed to control the heredity of all kinds of characters, though "autogenous fluctuation" is sometimes invoked in extreme cases. Like some of our American Mendelists, our author asserts his convictions the more emphatically when the facts seem to be carrying him away from the typical Mendelian points of view, as the following paragraphs will show:

"The author can only reiterate his conviction that all these hybrids are subject to Mendel's Law of segregation; often obscurely—on account of defective methods—but none the less certainly. The evidence available can all be interpreted in Mendelian terms, and it is very significant that most of it should appear at first glance to be completely dissociated from the classical ratios. Mendelian students of heredity have confined themselves to the more definable characters, such as color, partly because statistical characters take up an excessive amount of time in mere determination, and partly because the use of statistical methods is prone to provoke irrelevant criticism from mathematicians with whom the mere biologist cannot fairly compete. At the same time it is clear that the frontier of Mendel's territory is not demarcated by any special character and—with all their experimental disadvantages—the only characters which admit of complete treatment are those which can be measured with definable precision. There are many features of these complex results which bear a tantalizing resemblance to problems of human heredity" (p. 132).

Nor is our author lacking in scientific candor when the time comes for general statements regarding the practical application of Mendelism to the lint characters, and to the other features of the plant that do not lend themselves to direct statistical treatment.

"From what has been said above it will be clear that the 'style' of a lint sample is the resultant of an unknown number of unknown factors, both zygotic and gametic. When a set of F_2 samples is placed before an expert, this becomes obvious; the

expert finds one lint which resembles Afifi, except that it has the color of Yannovitch; he next meets another which has the color of Afifi, but which he would unhesitatingly affirm to be American Upland if the room were darkened. The task of analyzing an F_2 in this way is almost hopeless, however valuable the results may be for other purposes" (p. 147).

"We have now examined the nature of the problems which the non-measurable characters present. The general trend of the evidence is to show that inheritance becomes more complex as the crossed parents are less and less closely related. The amount of labor which the author has been able to apply to these problems, under the limitations imposed by natural crossing and accidental circumstances, has not been enough to produce one clean and indisputable proof for any character. Nevertheless, he believes that the preceding discussion will be found by later workers to represent the general position of a complex subject" (p. 149).

The expectation was that Mendelian breeding of new varieties would save the Egyptian industry from the danger of deterioration that seemed to be threatened. But the methods that were applied did not lead to an appreciation of the possibility of developing uniform Hindi-free strains of Egyptian cotton by the simple and direct means of individual selection and roguing of progenies and seed fields, as has been done in the United States. The new varieties that have gained prominence recently in Egypt, such as Assil and Sakellaridis, seem to have been developed without any relation to Mendelian investigations.

The practical utility of a scientific investigation often proves to be entirely different from what was expected. Though no direct applications of Mendelism seem to have resulted from the experiments, another important service was rendered. On the basis of his physiological studies Mr. Balls was able to give a biological confirmation of the idea that the increased supply of water made available through recent improvements of irrigation facilities in Egypt were responsible for a serious deterioration of the cotton crop. Extensive drainage works are now in progres as a means of controlling the subterranean water table in the cotton-growing districts of Lower Egypt.

Even on strictly scientific grounds, and apart from all questions of practical application, botanical readers are likely to agree that the investigations have given much more interesting results in other lines of research than in those that relate to genetics. Indeed, our author has recognized this on his own account, in the conclusion of his last chapter on heredity.

"All the characteristics mentioned in the chapter on Fluctuation have been made the subject of statistical records in the ordinary course of routine observations. Thus we possess the curves for growth, flowering, bolling, and shedding for almost every individual studied. Data for weight of lint per seed, and for ginning out-turn are also to hand, but the majority of these records are of more value as supplementary sources of information in physiology than from the standpoint of Genetics. At the same time, they are frequently of interest as showing the commercial resultant of those conflicting gametic forces whose lines we have endeavored to trace" (pp. 173–175).

O. F. Cook

PROCEEDINGS OF THE CLUB

March 26, 1913

The meeting of March 26, 1913, was held in the laboratory of the New York Botanical Garden at 3:30 P.M. Vice-President Barnhart presided. Twenty-two persons were present.

The minutes of the meeting of March 11 were approved. Dr. John H. Barnhart, chairman of the budget committee, submitted the following report which was adopted:

Estimated Income

Dues from members	$1,000.00
Additional dues from sustaining members	140.00
Bulletin	885.00
Torreya	125.00
Memoirs	400.00
Index cards	200.00
Advertisements	50.00
Interest on invested funds	50.00
	$2,850.00

Estimated Expenditures

Bulletin	$1,200.00
Torreya	520.00
Memoirs	400.00
Index cards	150.00
Salary of the secretary and treasurer	300.00
Reprinting old numbers of the Bulletin	100.00
Sundries	75.00
	$2,745.00
Estimated balance	105.00
	$2,850.00

The resignation of Jessie P. Rose was read and accepted. Mr. W. H. Lamb, Sylviculture Division of Forest Service, Washington, D. C., Professor F. H. Blodgett, Texas Agricultural Experiment Station, College Station, Texas, and Dr. W. T. Swingle, United States Department of Agriculture, Washington, D. C., were elected to membership.

The first part of the scientific program consisted of a paper on "Some Peruvian Marine Algae" by Dr. Marshall A. Howe. This was a preliminary report on a collection of about 100 species made by Dr. Robert E. Coker, now of the U. S. Bureau of Fisheries, while employed as a fisheries expert by the Peruvian government. It was stated that, although lying wholly within the tropics, the marine flora of Peru is essentially of a "temperate" character, the large and conspicuous seaweeds being kelps of the genera *Macrocystis*, *Lessonia*, and *Eisenia*. The absence of genera that are commonly considered peculiar to the tropics is doubtless due chiefly to the Humboldt Current, which brings northward along the western coast of South America the cold waters of the south. The temperature of the ocean waters off the coast of Peru, except for a short strip at the extreme north, has been compared by Dr. Coker to the summer temperatures of the Atlantic at New York and of the Pacific at Monterey, California. After a discussion of the earlier collections of algae made on the coast of Chili and Peru, specimens were exhibited illustrating some of the characteristic species of the region. These included several which appear to be hitherto undescribed and of which descriptions are soon to be published.

The second number on the program was entitled "Bud Varia-

tion in *Coleus*," by Dr. A. B. Stout. A discussion of the paper by Dr. Shull followed. Dr. Shull also remarked on certain bud variations which he had observed in connection with his studies in *Oenothera*.

Meeting adjourned.

B. O. Dodge,
Secretary

April 8, 1913

The meeting of April 8 was held at the American Museum of Natural History at 8:15 P.M. Vice-President Barnhart occupied the chair. Fifteen persons were present.

There being no business to be transacted the scientific program was in order. The announced lecture on "Some Connecticut Swamps," by Dr. George E. Nichols was postponed on account of the inability of Dr. Nichols to be present. Dr. W. A. Murrill was secured to fill the vacancy. His lecture on "Botanizing in the Region of Jalapa, Mexico," was illustrated with a large number of lantern-slides.

A brief account was given by the speaker of the journey from Veracruz to Jalapa across the low, fertile zone between the coast and the foothills and then the climb through the low, limestone hills covered with luxuriant vegetation which separate the coastal zone from the higher altitudes about Jalapa.

Jalapa is charmingly situated upon the eastern slope of Cerro Macuiltepec at the edge of a splendid primeval forest. The town is very ancient and has changed little in its general plan since Cortez passed through it on his journey to the Aztec capital. On the first promenade through Jalapa, interest will probably center in the main plaza, dominated by the old cathedral; Juarez Park, with its strange trees and flowers, its prehistoric carvings, and its splendid view of the long, narrow street leading up from the railway station; the old massive houses with projecting roofs and balconies filled with flowers and happy faces; the private gardens and orchards of oranges, bananas, cherimoyers, peaches, tree tomatoes, and cacti; the many shops filled with merchandise from far and near; and last, but not by any means least, the crowds of strange people dressed in strange

ways, speaking an unfamiliar tongue, and acting in unfamiliar ways. The streets are not only crowded with people, but with donkeys, horses, and mules, many of them bearing panniers of charcoal, fodder, ice, milk, fruits, and vegetables.

The market of Jalapa is very interesting and contains a profusion of interesting tropical products which are brought in from the surrounding country and exposed for sale in small booths, or on the ground, by native men, women, and children. Much of it is of poor quality and undersized, as though grown in sterile soil or with little cultivation. This is very noticeable in the case of cocoanuts, peanuts, and tomatoes, the last especially being invariably small, deeply creased, and badly flavored.

The variety and abundance of flowers, ferns, mosses, and bright-colored foliage plants in the primeval forest surrounding Jalapa is bewildering. Here are tree-ferns thirty feet in height, with wide-spreading fronds representing the very perfection of grace and beauty in leaf-structure; while hundreds of smaller ferns adorn the forest floor. Not only is the ground covered with vegetation, but every tree is a garden, where vines, bromeliads, and orchids, as well as tree-loving ferns, mosses, fungi, and lichens make their home. Jalapa has long been a favorite resort for the collector of medicinal plants and rare orchids, fungi, etc. The familiar jalap of the older doctors was a powerful cathartic derived from a vine of the morning-glory family known as *Ipomoea Jalapa*, and sarsaparilla is likewise obtained from *Smilax medica*, the Mexican relative of our common cat-brier. Vanilla is extracted from long, highly-flavored beans, which are the fruits of an orchid common about Jalapa.

Orchids, of which there are over ten thousand known species, have always attracted attention because of their fantastic shapes and colors, their peculiar mode of life, and the difficulty of collecting and cultivating them. Fifty years ago, men were scouring tropical jungles and braving fevers, wild animals, and wilder men to secure rare and unusual kinds, some of which brought fabulous prices. Since methods of growing them in conservatories have been fairly well worked out, it is not necessary to replenish them every year as formerly, and the attention of orchid lovers

has been directed to the making of valuable hybrids. Only a year or two ago a special Orchid Section was organized in the New York Horticultural Society to promote the cultivation and popularity of these wonderful plants by means of addresses, pamphlets, and public exhibitions. In the conservatories at the New York Botanical Garden the orchid houses are especially well filled, and the collection is being rapidly increased by gifts and by exploring parties sent by the garden into various parts of tropical America.

Meeting adjourned.

B. O. Dodge,
Secretary

NEWS ITEMS

On Saturday, May 24, 1913, the ninth public meeting of the Sullivant Moss Society was held at the Brooklyn Botanic Garden and the Brooklyn Institute Museum, with the President of the Society, Prof. Alexander W. Evans, of Yale University, presiding. At the morning session, held in the museum building, colored lantern slides of mosses and hepatics were exhibited by Dr. Abel J. Grout, and papers were presented by Miss Caroline Coventry Haynes, Mr. G. K. Merrill, Miss Annie Lorenz (read by Dr. Edward B. Chamberlain), Dr. Otto E. Jennings (read by Mrs. Annie Morrill Smith), and Dr. George Hall Conklin. Photographs and autographs of bryologists were exhibited by Mrs. Smith, Vice-President of the Society, and a collection of works on Bryophyta by Miss Hutchinson, the librarian of the museum. Herbarium specimens of mosses and hepatics were also exhibited by Mr. E. L. Morris, curator of natural history. After luncheon at a local restaurant a trip was made through the Brooklyn Botanic Garden, including the first sections of the laboratory building and conservatories now nearing completion and to the local flora garden. The session closed with a visit to the hall of botany of the museum, where were exhibited wax models of fungi, and glass models of fungi and algae recently made, specially for the museum collections.

The remaining lectures for the summer course at the New York Botanical Garden on Saturday afternoons are as follows: July 5,

"The Hempstead Plains: A Natural Eastern Prairie," by Mr. Norman Taylor; July 12, "Swamps: Ancient and Modern," by Dr. Arthur Hollick; July 19, "The Flora and Scenery of the Southern Rocky Mountains," by Dr. P. A. Rydberg; July 26, "Water Gardens," by Mr. G. V. Nash. The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. Doors closed at 4:00 P.M.

We learn from the daily press of the death of George W. Letterman, near St. Louis, on May 28. The "*Times*" writes in part of his life thus: "George W. Letterman, aged 72, a recluse and botanist, died in poverty and attended only by a negro neighbor in his little cabin at Allenton, thirty miles west of St. Louis, last night. Mr. Letterman had lived in Allenton for thirty years. For twenty years he was a teacher in the public school there. He was a bachelor. Throughout his long stay in Allenton the botanist lived alone in his one-room cabin, spending most of his time in the woods in search of rare plants and trees. Many distinguished American and European scientists made pilgrimages to his cabin and went on excursions with him through his beloved woods along the Meramec. Many rare plants which he discovered were named after him. . . . Harvard professorships twice were offered to Mr. Letterman, but he waived them aside as temptations, preferring the woods to halls of learning." Some of the genera containing species named for him are *Vernonia*, *Poa*, *Stipa*, and *Crataegus*. It does not appear that he ever published anything.

Mr. Maurice Picard, A.M. (Columbia, 1911), has been appointed assistant professor of botany in Middlebury College.

Mr. H. E. Vasey has been appointed field assistant in agricultural botany at the University of Nebraska. Hestor M. Rusk, A.B. (Columbia), has been appointed instructor in agricultural botany at the same institution.

The American Phytogeographic Excursion, under the direction of Professor H. C. Cowles, has announced the final plans for the trip during August and September. The party will leave New York on July 30, stopping at Niagara Falls en route to Chicago, where eight days will be spent. Lincoln, Nebraska,

will be the next stop, from which the party will go to Colorado. Salt Lake City, Tacoma, Medford, and San Francisco will be reached by relatively quick stages, a week being spent in the vicinity of the latter place, including an excursion to the Yosemite National Park. On Sunday, September 14, the party will reach Carmel, California, from which they will go to Mecca and thence to Tucson, Arizona. At the latter plate headquarters will be at the Desert Botanical Laboratory. The official excursion will close here on September 23, the party returning to New York via whatever route individuals may select. Further particulars may be had from Dr. H. C. Cowles, University of Chicago.

At the Alabama Polytechnic Institute, Auburn, Alabama, changes in the staff have occurred as follows: Dr. E. P. Sandsten, professor of horticulture and state horticulturist, resigns to accept a similar appointment in Colorado State College. A. B. Massey, formerly assistant professor of botany and bacteriology in Clemson College, becomes assistant professor of botany. H. N. Conolly, field agent in horticulture, resigns to accept similar work in Colorado State College.

At the dedication of a new "Plant Industry Hall" at the University of Nebraska on June 10, the dedication address was made by Dr. J. M. Coulter, of the University of Chicago. His subject was "Practical Science." Following the exercises the building was thrown open to the public.

A biological expedition is being sent out by the University of the Philippines and the Bureau of Science. It started from Manila on April 5 for Taytay Bay on the northeastern coast of the Island of Palawan, and will remain in the field for two months. The party will consist of Dr. Merrill, chief of the division of botany of the Bureau of Science, Mr. Schultze, entomologist of the Bureau of Science, Mr. Rowley, instructor in geology, of the University of the Philippines, Messrs. Griffin, Cowles, Wharton, Day and Light, of the department of zoölogy of the university, and Mr. Barnes, teacher of zoölogy of the Bureau of Education. Including the assistants and laborers, the working party will consist of about twenty-five persons. The expedition will be under the direction of Professor Griffin. The region to

which the party goes is entirely unexplored, but is said to be extremely rich in its fauna and flora.

Dr. Philip Dowell will spend July and August as assistant curator at the United States National Museum, Division of Plants.

Dr. William A. Murrill is in Europe, studying types of fungi and the effect of tar dust on the trees planted on roads where the surface binding is of tar.

At the Johns Hopkins University Dr. Edward W. Berry has been advanced from associate to associate professor of paleobotany, Dr. D. S. Johnson has been appointed director of the botanical garden, and Dr. B. E. Livingston has been appointed director of the laboratory of plant physiology.

The Geological Survey of Alabama has just issued Part I of the Economic Botany of Alabama, a geographical report, including descriptions of the natural divisions of the state, their forests and forest industries; by Roland M. Harper, Ph.D., who has been gathering the material for this report since 1905, in every county in the state. It is a booklet of 228 pages, including a colored map and 63 half-tone views of forest scenery and industries. The edition is limited to 3,000 copies, and most of these will go to libraries and individuals already on their mailing list. But as long as the supply lasts a copy will be sent on request to any address in the United States on receipt of seven cents in ordinary postage stamps (not parcel post stamps) to cover postage. Applications should be addressed to Eugene A. Smith, University, Ala.

On the seventh of June the second edition of Britton and Brown's "Illustrated Flora" was published by Chas. Scribner's Sons, New York. A review of this work will appear in TORREYA for August.

A continuation of last year's botanical collection and study will be made along the northwestern shore of Lake Superior, and inland from there, during the present summer by Dr. and Mrs. O. E. Jennings, of the Carnegie Museum. Operations began at Fort William about June 20.

The Torrey Botanical Club

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BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

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THE RELATION OF FOREST DISTRIBUTION AND PRAIRIE FIRES IN THE MIDDLE WEST *

By Henry Allan Gleason

In a previous paper (1912),† referring to the location of certain isolated groves in central Illinois, it was shown that they were uniformly situated on the eastern side of prairie sloughs, and the conclusion was advanced that their existence in these places was due to the protection against prairie fires furnished by the water barrier. Since the publication of this paper, a number of similar facts have come to hand, all serving to indicate the efficiency of ponds or streams in protecting forests from the incursions and destructive effects of prairie fires. In general it may be said that the location of forests throughout central and northern Illinois, and also through the adjacent states, is closely correlated with prairie fires.

It is well known that the prevailing winds throughout most of the Middle West come from the west, varying from northwest to southwest. Prairie fires would, therefore, in most cases travel toward the east, and would attack the forest on the west side. Doubtless there were frequent cases where fires were driven in other directions, but these must have been of vastly less importance than the very numerous fires travelling toward the east. In the different descriptions of prairie fires which have been consulted, and in the information furnished by eye-witnesses of them, there is no specific mention of fires travelling in any direction except east.

* Contribution No. 141 from the Botanical Laboratory of the University of Michigan.

† Henry Allan Gleason, An isolated prairie grove and its phytogeographical significance (with two figures). The Botanical Gazette, vol. 53, pp. 38–49. Chicago, 1912.

[No. 7, Vol. 13, of Torreya, comprising pp. 151–172, was issued 8 July 1913.]

It is also a matter of record that the fires did destroy some of the trees at or near the forest margin, and thus gradually drive back the forest toward the east. The margin of the forest in Illinois was originally characterized chiefly by hazel, a shrub which is not seriously affected by repeated burning. Inside of the hazel zone the forest was composed chiefly of oak, especially *Quercus velutina* and *Quercus imbricaria*, neither of which produces a very dense shade. There seem to be no authentic data on the matter, but it is entirely probable that even within the hazel margin there were numerous grasses, sufficient to feed a more destructive fire than the usual litter of leaves and dead twigs. At the present time, at least, various prairie species are found within the forest margin (1910, pp. 119, 123, 124)* and their number and density is greatly increased by even a small increase in the amount of light. The only undisturbed contact of typical virgin prairie and forest observed by the writer in Illinois has been so long protected from fire that the forest margin has grown up to an almost impenetrable thicket of several species of shrubs, whose prevailingly avevectent mode of dispersal may indicate their recent arrival in the habitat.

It has generally been the idea that prairie fires were vast conflagrations, driven before the wind at an incredible rate, and consuming everything in their path. Such fires doubtless occurred, but the violent winds necessary for driving them are not common in the Middle West in the early autumn, when the fires were most abundant. When such fires did occur, they naturally created a more vivid impression in the mind of the observer, so they were chosen for printed description.† The

* Henry Allan Gleason, The vegetation of the inland sand deposits of Illinois. 6 illustrations, 20 plates. Illinois State Laboratory of Natural History Bulletin, vol. 9, pp. 23–174. Urbana, 1910.

† An anonymous author describes a prairie fire in these words (Travels through the United States and Canada, London, 1828, p. 187): "The flames advanced very rapidly, continued to spread, and before they had arrived opposite to the place where I stood, formed a blaze of fire nearly a mile in length. How shall I describe the sublime spectacle that then presented itself? I have seen the old Atlantic in his fury, a thunder storm in the Alps, and the cataracts of Niagara; but nothing could be compared to what I saw at this moment. The line of flame rushed through the long grass with tremendous violence, and a noise like thunder; while over the fire there hovered a dense cloud of smoke. The wind, which even

ordinary prairie fire, on the contrary, was a slowly moving fire, with its flames reaching heights of three to ten feet, or rarely more. When such a fire reached the margin of the forest, with even less fuel, its intensity and destructive power were still further decreased, so that it is doubtful if mature trees were ever killed by a single fire. But the seedlings must certainly have been destroyed in large numbers, and the repeated charring of the bark of the larger trees led after a few years to their death. Statements to this effect may be found in several of the older books of travel. Loomis (1825)* states: "I have observed that on the western edges or borders of all the large prairies a thick growth of young timber is springing up, whereas on their eastern borders no underbrush is found within many rods of the open lands. The heat and fury of the flames driven by a westerly wind far into the timbered land . . . destroying the undergrowth of timber, and every year increasing the extent of prairie in that direction, has no doubt, for many centuries added to the quantity of open land found throughout this part of America." Brackenridge (1814, p. 109)† makes a similar statement: " . . . the progress of the fire can be traced; the first burning would only scorch the outer bark of the tree; this would render it more susceptible to the next, and the third would completely kill." And as a last quotation, the rather explicit statement of Jones (1838, p. 90)‡ may be given: "This yearly burning consumes all the new trees and shrubs, and leaves the ground entirely unencumbered. The old trees, likewise, are annually diminishing in number. Scarcely a tree but is marked with fire, and when once the bark is penetrated by the fire, and the wood of the tree seared, the fire takes a readier and deeper hold thereon, until at last it overpowers and destroys it, and the tree falls with a startling crash, and generally consumes before the fire dies out, unless a violent rain extinguishes it, and leaves it for

previously had been high, was increased by the blaze which it fanned; and with such vehemence did it drive along the flames, that large masses of them appeared actually to leap forward and dart into the grass, several yards in advance of the line. It passed me like a whirlwind, and with a fury I shall never forget."

* Chester Loomis, Notes of a journey to the Great West in 1825. Pamphlet.

† H. M. Brackenridge, Views of Louisiana. Pittsburgh, 1814.

‡ A. D. Jones, Illinois and the west. Boston, 1838.

food for the next annual passage of the devouring element. I have beheld many a line of ashes, marking the spot where the entire trunk of a massy oak was consumed the previous autumn."

The first invasion of forests into the Middle West was undoubtedly along the stream courses, where the more rapid erosion of prairie humus, the looser prairie sod, and the protection from excessive insolation and wind favored the germination of tree seeds and the growth of the seedlings. The forests migrated up the streams, following rather closely the valley and the adjacent bluffs, usually as far as the effects of erosion were obvious. They also migrated laterally from the valleys toward the uplands, where they soon encountered the denser prairie sod, which materially checked their further extension. The general result of this forest invasion, as seen a century or more ago, was the presence of a belt of forest along all the larger water courses, varying in width with the size of the stream.

It is not necessary to hazard an opinion as to the probable date of the first prairie fire or its possible cause. It may be stated that the writer has no record of a prairie fire produced by lightning. If such a cause ever produced fires, they must have been at widely separated intervals, and could have produced no appreciable effect on the forests. But it is definitely known that the Indians habitually started fires, and the prairie fire as a phytogeographical factor dates back to the entrance of the Indian or to the origin of this habit.* Since that time, the forests were attacked practically every year on their western flanks by prairie fires, and occasionally also on their eastern sides as well, unless they were protected by some unusual feature of the topography or by standing water.

The effects of prairie fires from the east upon the forests are

* One of the first statements to this effect was made by Hennepin (Voyage ou nouvelle decouverte d'un tres-grand pays, dans l'Amerique enter le nouveau Mexique et la mer glaciale, 1704, pp. 183, 184, 185), in describing his travels across Illinois in 1679. "Ce ne sont que de grandes campagnes decouvertes, dans lesquelles il ne croit que de grandes herbes, qui sont seches ordinairement dans la saison, que nous y arrivames. Les Miamis les avoient brulées en chassant aux boeufs ou taureaux sauvages." "Ils y avoient mis le feu dans les herbes fanées pour tuer plus facilement les taureaux & les vaches sauvages." "Les Sauvages ayant mis le feu dans les herbes seches de toutes les preries de notre route."

negligible. The isolated prairie groves described in an earlier paper are all open to the east, but they have persisted because of their western protection by sloughs.

But the fires coming from the west have made a great effect upon the forests, and indirectly upon the soil as well. They have in some cases completely cut off portions of the forest from the main bodies with which they were formerly connected, producing thereby isolated groves. A second effect is seen in the exemption of certain portions of the prairie from fires, upon which habitats forests have developed after the introduction of fires. A third effect is seen in the general restriction of forests on the west side of streams to narrower belts than are found on the east side of the same streams, and a fourth in the apparently complete removal of thousands of acres of forest and its conversion into prairie. These results of fires will be discussed in turn.

I. Isolated prairie groves are of common occurrence in central Illinois, and doubtless also in other parts of the Middle West. The description of one such grove has already been cited. The location of others may be determined by reference to county histories, and more exactly by the original land surveys of the various counties. These surveys, made between eighty and ninety years ago, show the location of the forests with considerable accuracy, if at all, but in some counties no definite mention of the forests is made, and in a few cases some of the groves have been omitted. These are mostly of small size, and while of considerable significance to the phytogeographer, were probably not considered by the surveyor worthy of mention.

Copies of the original surveys have been examined and tracings made for eight adjacent counties in central Illinois, Champaign, Coles, De Witt, Douglas, Macon, Moultrie, Piatt, and Shelby. They indicate over twenty such isolated groves, of various shapes and sizes, and located in various habitats. Every one of these which has been visited by the writer, except two referred to under the next general effect of fires, is in some way connected with a stream or series of sloughs. Those which are located along streams are probably remnants of a former continuous strip of forest which has been cut in sections by fire. In

each case examined the portion of the river valley from which the forests have been removed is shallow and without prominent bluffs, while those portions in which the forests are still standing show more pronounced effects of erosion. The bluffs and ravines of these more rugged valleys have doubtless been of great importance in protecting the forests from the fires.

Some of these isolated groves are still in a pioneer condition, with oaks as the chief or sole component of the forest, as in Bur Oak Grove, described in an earlier paper. Others had reached a climax stage before the fires separated them from the main body of the forest, and contain such typical mesophytes as *Acer Saccharum*, *Tilia americana*, *Quercus Muhlenbergii*, and *Cercis canadensis*. This is especially true of Big Grove, adjacent to the city of Urbana in Champaign County. Those groves farthest up stream are usually especially characterized by *Quercus velutina*, *Quercus imbricaria*, or other similar xerophytes.

In some cases, also, the stream valley between the isolated grove and the main body of forest has in recent times grown up to a narrow fringe of trees, in which *Ulmus americana* is usually most abundant.

II. There are two groves in Champaign County of such peculiar nature that only recently a satisfactory explanation for them has been obtained. These are Mink Grove, situated just west of Rantoul, and easily visible from the Illinois Central Railway, and Linn Grove, four miles southeast of Philo. Their most remarkable feature is the complete absence of the genus *Quercus*, a phenomenon which probably could not be duplicated in any other forest area of equal extent in the state. Mink Grove, the smaller of the two, is located on a low morainic hill, surrounded on three sides by low ground. Before drainage this slough was usually full of standing water and was marked on the original survey (with some slight errors of shape) as a lake. Obviously it was easily protected from fire. The nearest forest at the present time is about six miles away. The characteristic trees are *Carya cordiformis*, *Gleditsia triacanthos*, *Ulmus americana*, *Ulmus fulva*, *Prunus serotina*, *Juglans nigra*, *Celtis occidentalis*, *Morus rubra*, and *Crataegus* sp. Of these nine species four

are distributed by birds, two by wind, and the other three have edible pods or nuts.

Linn Grove received its name from the presence of the linn or basswood. It is situated on a high morainal hill, surrounded by unusually rolling land, with thin or no prairie humus. It probably owes its immunity from fire to the poverty of the prairie vegetation. The trees in this grove are *Tilia americana*, *Ulmus americana*, *Ulmus fulva*, *Juglans nigra*, *Prunus serotina*, *Carya cordiformis*, *Morus rubra*, *Gleditsia triacanthos*, *Gymnocladus dioica*, *Celtis occidentalis*, and *Crataegus* sp. The similarity of this list to the flora of Mink Grove is striking. Linn Grove was for many years left practically untouched, although a few trees were taken out for firewood. The undergrowth was of a mesophytic climax type, with *Asimina triloba* and *Cercis canadensis* as the common shrubs, and a rich herbaceous flora with such characteristic mesophytes as *Trillium declinatum*, *Sanguinaria canadensis*, and *Adiantum pedatum*.

The only explanation which can be offered for these two groves is that seeds of certain forest trees were carried by birds (or by Indians?) to these protected spots. With the development of a forest cover, other species gradually immigrated, while the relatively immobile oaks have never been able to cross the intervening fire-swept prairies.

III. The third general effect of prairie fires upon the forest is seen in the generally narrower belt of forest along the western side of streams. In some places the forest is completely limited to the eastern side, in almost every case it is notably narrower, and the widest strips of forest are invariably found where a bend in the stream has afforded protection from both the west and the south. Neither is this feature limited to central Illinois, where the attention of the writer was first attracted to it. It seems to be a common feature of the forests throughout Illinois and eastern Iowa, at least, and is excellently shown by McGee in his map of the forests and prairies of northeastern Iowa.*

On the west side of streams running north or south, the forest

* W J McGee, The Pleistocene History of Northeastern Iowa, U. S. Geol. Surv. Ann. Rep. 11, pt. 1: 199–577. Pl. 22. 1891.

seldom extended beyond the line of bluffs, and was composed quite generally of the more hydrophytic species of the river bottoms. On the east side it frequently extended out upon the uplands to a considerable distance, and was there composed of the more xerophytic species, especially the oaks and hickories. A careful estimate of the forest areas in Champaign County, based on the original land surveys, indicates that about 68 per cent. was located at the east and north, and only 32 per cent. at the west or south.

Closely allied to this effect of prairie fires is the shape of the extremities of the forest farthest upstream. These were originally not narrow tongues, composed of permobile species, but were broadly rounded in shape, and characterized chiefly by the less mobile species, as the oaks and hickories. Along the three rivers which rise in Champaign County, it is never more than two miles from the end of the forest to mesophytic associations with basswood, papaw, and sugar maple. On these three rivers, also, the forests extend upstream just as far as there is a marked contrast between upland and flood plain. Beyond, where base-leveling has not been prominent, the prairies were continuous on both sides of the stream. Since in general the mobile species migrate farther up the streams at present, it may be concluded that the former extremities of the forest belts have been destroyed by fires.

IV. The belief of the writer that the forests in central Illinois, and probably in many other parts of the Middle West, formerly occupied a much greater area than at present has already been stated. It seems probable that these forest belts extended up the streams a little farther toward their sources than at present; that their width was greater; and that there were also extensive forests developed along the more rugged moraines. The evidence for the latter statement demands some explanation.

There are in central Illinois even at the present time various places where forests are developed on the moraines, independently of streams. Such is the case on the Bloomington moraine between Bloomington and Peoria. On other moraines now unforested there are frequently various species of plants which

are usually characteristic of the forest. Some of these, as *Claytonia virginica*, *Erythronium albidum*, and *Trillium recurvatum*, are geophytes of the prevernal season, which complete their annual cycle of development before midsummer, and at the usual time of prairie fires are already in the resting stage. In that condition they would not be injured by fires and, since their methods of seed dispersal are not very efficient, they suggest very strongly that their present habitat was formerly covered by forest. If they were recent introductions from the forest, they might be expected most abundantly near the forest, and on other types of soil besides the morainal hills. However, the only records of these species growing together, and the only prairie records of any sort known to the writer for *Erythronium* and *Trillium*, are from morainic hills at a considerable distance from existing forests.

It has already been mentioned that the hazel was a characteristic plant of the forest margin, and that it was not seriously injured by fire. If the forest was completely removed by fire, it might be expected that the hazel would be the last forest shrub to disappear. There is one record known to the writer of a large hazel thicket, covering several acres at the western edge of an upland forest, and several such records of scattered thickets of hazel in the middle of the prairie, but always on moraines.

All three lines of evidence point to the same conclusion, and it may even yet be possible to determine the migration route of the morainal forests from other forests along the river systems.

In conclusion, it seems evident that prairie fires have been the deciding factor in determining the distribution of forests in the Middle West. With prairie fires eliminated, the forest is naturally dominant, and tends to spread over wider areas at the expense of the prairie. Under the attack of prairie fires, the forests have been driven back or destroyed, except in those areas where the favor of morainic or fluviatile topography has enabled them to resist the encroachments of the prairie.

University of Michigan

NOTE ON THE ALPINE DWARFING OF POLYGONUM BISTORTA

By J. Arthur Harris

In evolutionary writings one frequently meets statements concerning increased variability of a species subjected to new conditions.* In connection with some work on this question, it seemed worth while to consider the variability in individual habitats of a species ranging from lowland to alpine conditions. The familiar *P. Bistorta* L. of the Rocky Mountain region appeared to be a good subject. In August, 1906, I collected seven small series for a preliminary investigation, in the Pikes Peak and Mount Garfield region of Colorado. The localities need not be described in detail.

The series are numbered in the order of (as it seemed to me) increasingly alpine conditions.† The diagram shows the length of the flowering stalks. The crosses on the bars show the mean value and length of the bars the range in variation for the several series.

Expressing the results in the convenient biometric constants, we note from the table that as the conditions become more alpine the average length and the standard deviation, measuring the absolute variability around the mean length, greatly decrease. But when we express variability in relative terms by taking the ratio of the absolute variability to the mean, *i.e.*, Standard Deviation × 100 / Mean = coefficient of variation, we note that the variability is about the same from habitat to habitat. Considering fluctuations due to sampling it is not safe to say that the coefficients of variation differ at all among themselves. But it is noticeable that the coefficients of variation are lowest for lots I and VII which have the maximum and the minimum development of stalk length. These are also unquestionably

* For a review of some of the pertinent literature see Harris, Amer. Nat. 43: 350–355, 1909.

† Elevation is the only point upon which quantitative information could be secured. By Alpine I have understood more the ecological condition than the altitude merely. In making my estimates I was guided by the general physical surroundings and by the appearance of the vegetation.

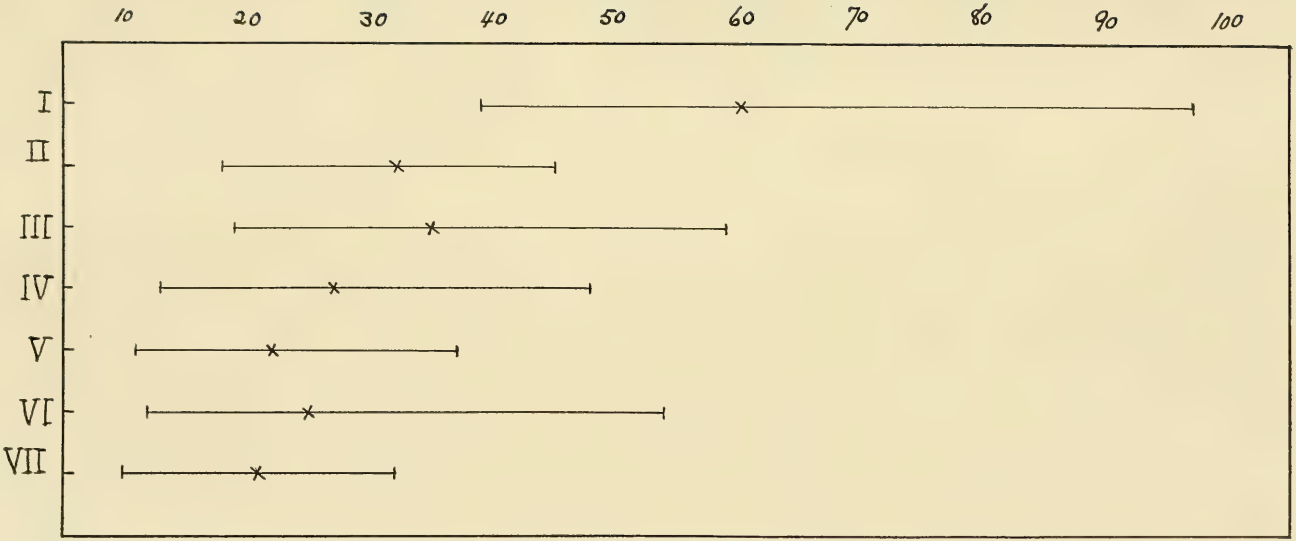

FIG. 1. Diagram showing length of flowering stalks in centimeters for seven habitats. I is the lowest and VII is the most alpine. The length of the bars show the range in variation while the crosses show the mean weight.

the ecological extremes of the series — lot I the lowest habitat, a moist meadow thicket near the "Half Way House," and lot VII the highest, the alpine meadow at "Windy Point."

This result is, I think, suggestive. The problem which it raises is this: In a series of habitats (ranging from the most lowland to the most alpine conditions), each apparently uniform in itself, is the lowest variability found in the most extreme environments?

The present data are of course quite inadequate for an answer to the problem. The purpose of this note is merely to call it to the attention of other botanists who in vacations in the mountains may have the opportunity of securing data really ample for its solution.

Lot	Plants Measured	Mean and Probable Error	Absolute Variability and Probable Error	Relative Variability and Probable Error
I	185	60.24 ± .59	11.81 ± .41	19.6 ± 0.7
II	37	32.78 ± .92	8.27 ± .65	25.2 ± 2.1
III	85	36.16 ± .55	7.47 ± .39	20.7 ± 1.1
IV	106	27.59 ± .46	7.01 ± .32	25.4 ± 1.3
V	68	22.47 ± .50	6.09 ± .35	27.0 ± 1.7
VI	139	25.02 ± .40	6.93 ± .28	27.7 ± 1.2
VII	117	21.00 ± .28	4.42 ± .19	21.0 ± 1.0

THE PRESERVATION OF OUR NATIVE PLANTS

In August, 1901, the Misses Olivia and Caroline Phelps Stokes presented to the New York Botanical Garden a fund of $3,000, the interest of which has been used for the protection of native plants. Various methods have been tried, beginning with a series of three prizes for essays on this subject, offered first to the teachers and older persons, which resulted in a number of good essays, the best of which were printed in the *Journal* of the New York Botanical Garden in 1902 and 1904. The prize essays were written by Dr. F. H. Knowlton, U. S. National Museum, Washington, D. C.; Miss Cora H. Clarke, daughter of James Freeman Clarke of Boston; Dr. A. J. Grout, Boys' High School, Brooklyn; Miss Mary Perle Anderson, supervisor of nature study, University School for Girls, Chicago, Ill.; Miss Jean Broadhurst, of Teachers' College, Columbia University, and Mr. G. Gordon Copp.

In 1910 another series of smaller prizes were offered to students in the high schools, and these were won by students from the Washington Irving High School, the boys high school in Brooklyn and the Morris High School, Bronx.

Finding that many of the wild flowers were gathered by the children for their teachers and that large quantities were supplied for the high schools of New York City, it was arranged through the interest of one of the members of the board of education that the following wild flowers should be eliminated from the list of botanical supplies in the New York public schools: trailing arbutus, wild columbine, fringed gentian, hepatica, Indian turnip, moccasin flower, wake-robin, wild orchid; and cultivated plants have been substituted for wild ferns, Solomon's seal, wild geranium and others.

During the year 1912 and the present year, the accumulated income of the Stokes' Fund has been used for colored illustrations for a series of essays on "Wild Plants Needing Protection" and has included (1) the Jack-in-the-pulpit; (2) spring beauty; (3) wild pink; (4) wild columbine; (5) bird's foot violet; (6) wild azalea; (7) moccasin flower; (8) dog-wood and (9) laurel. The essays have been reprinted and may be had at a nominal price from the New York Botanical Garden. Extra copies of the colored plates have been made and are to be distributed to the schools of New York City for framing.

Lectures illustrated by colored lantern-slides, have also been given under the auspices of the Garden. In this way a general interest has been aroused, which has resulted in the foundation of the "Wild Flower Preservation Society of America" with a large membership in various cities of the east. Local chapters have been organized in several of them, and further information may be had on application to

MRS. N. L. BRITTON,
Secretary-Treasurer

NEW YORK BOTANICAL GARDEN,
BRONX PARK, N. Y. CITY

REVIEWS

Britton and Brown's Illustrated Flora: Second Edition*

The appearance of the second edition of the "Illustrated Flora" marks a new epoch in the study of the plants of eastern North America. That there has been a persistent demand for the older edition, long since exhausted, well illustrates the position that its successor will undoubtedly occupy. The conception of a work of this scope, with illustrations of every one of our flowering plants and ferns and fern allies, appeals to the imagination. The very size of the undertaking and its final accomplishment, there are 4,666 species described and figured in the second edition, impresses one with the untiring fidelity of the authors to that original idea which culminated in the first "Illustrated Flora."

The present work is no mere retouching of the old plates, no *laissez-faire* revision of an old work as complete in its day as possible. It is a fundamental and thorough revision, shot through with all the principles and precepts that have been fostered and nurtured at the New York Botanical Garden. Besides the changes made necessary by adherence to these principles, the book is further enhanced by the addition of 504 species not previously described or figured by these authors in their first edition.

During 1908, Dr. Britton issued his paper on the taxonomic aspect of the species question,† in which he announced his view of the status of varieties and species, relegating the former to other than botanical usage, and suggesting for these forms "assumed to be of lower rank than species" the term races. "For general taxonomic purposes, these need not be designated; the conception and description of the species is broad enough to include all races of which it is composed." In the present edition of the flora, this proposition has been adhered to and all the many varietal names, usually trinomials, of the first edition

* Britton, N. L., and Brown, Addison. An illustrated flora of the northern United States and the British possessions. In 3 volumes. Vol. 1, pp. v–xxix + 1–680, fig. 1–1658; Vol. 2, pp. 1–735, fig. 1659–3329; Vol. 3, pp. 1–637, fig. 3330–4666. Chas. Scribner's Sons, New York. Price $13.50. (Issued 7 June, 1913.)

† Am. Nat. **42**: 225–242. 1908.

are lacking. Instead, notes such as the following are frequently inserted at the end of the description of the typical form: "Here regarded as consisting of numerous slightly differing races, perhaps including the five following described as species."* In this fashion, or by the raising of old varieties to specific rank, hundreds of varietal names that appeared in the first edition, are, for taxonomic purposes, obliterated. The authors have felt that these forms or races are worthy of notice, hardly of nomenclatorial recognition. This feature undoubtedly simplifies the problem, but to the old-line describer of plants, the stickler for varietal characterization, it will seem almost like an evasion. That the method here followed is an eminently sane and practicable one, seems almost axiomatic when we remember that, in a flora as rich and variable as our own, there is simply no limit to the ingenious fecundity of acute observers in describing and naming so-called varietal forms. Such things have happened in the past, notably in the genera,—but charity forbids the disclosure of the groups that have been fair game for these sharp practitioners. It is unquestionably with something like real relief that the average user of the present work will greet the altogether practical, and pragmatic, method of disposing of this problem.

The wholly modern tendency to subdivide existing genera and families into smaller and smaller categories is a movement to which the authors have lent the weight of their great authority throughout the present work. They have split up many large, often unwieldy groups, into smaller, and presumably more manageable units. There are good arguments for the old method of making large genera and families with a liberal use of subgeneric and subfamily headings; there are equally good, or better, arguments for making smaller and tighter categories. Most of us, suckled on the old manuals, have clung tenaciously to old ideas, but the attempt to keep always an open mind to the many advantages of the newer method has forced us into more or less of a dilemma. The new edition will undoubtedly settle this perplexing question for some of us who

* See *Aster macrophyllus*, Vol. 3, p. 411.

could never quite decide on which horn of the dilemma we cared to be impaled. That some of these changes have been drastic will be seen from the following list of family names, culled at random, that appear for the first time in the Illustrated Flora: Aesculaceae, Alsinaceae, Cacombaceae, Cannabinaceae, Corrigiolaceae, Lobeliaceae, Trilliaceae and Zannichelliaceae. There are doubtless others and in the index both the old and new family names have been indexed, so that those unfamiliar with these new designations need not be confused.

The same policy has been followed in the subdivision of existing genera, but these changes are too numerous to mention here. Wherever, for the sake of accuracy of characterization or unification of more or less constituent subgeneric groups, the authors have seen an opportunity to divide such groups, they have done so.

This is not the time, or is a review the place for any lengthy discussion of that spectre of modern taxonomy, nomenclature. Of course, the present authors have steadfastly followed the code of which Dr. Britton has for many years been the chief exponent. Fourteen years of adherence to this system, aided by a constantly increasing library and collection and the constant "nailing" of old types, must result in many changes. These are unfamiliar to most of us who have not the opportunity or the highly specialized training necessary for work of this sort. Such changes, and there are many in the present work, will be greeted with enthusiasm by those who appreciate the ideal that has generated them, and with something like consternation by that large class of stand-patters who prefer conservatism to a policy that "may seem to some to be too radical."*

For the reasons outlined above,— the tendency to split into smaller generic and family units, the strict adherence to the principles of nomenclature now too well known to need further discussion, the fixing of generic and specific types, and above all, the access to a splendid library,—all these have necessitated many changes in names. In the following list the reviewer has attempted to give changes in generic names, that differ in the

* See Introduction, Vol. I, p. vi.

two editions. The first name is that of the first edition followed by the name or names applied to the same category in the second edition. The list may not be quite complete but it is printed with the hope that it may aid those who have not the opportunity to work out all these changes for themselves.*

Abromia (in part) = Tripterocalyx
Achroanthes = Malaxis
Actinospermum = Endorima
Adicea = Pilea
Adelia = Forestiera
Adopogon = Krigia, Cynthia and Cymbia
Aira = Aspris
Alchemilla (in part) = Aphanes
Alisma (in part) = Helianthium
Ammodenia = Honkenya
Ampelanus = Gonolobus
Andropogon (in part) = Schizachyrium and Amphilophis
Apios = Glycine
Apium = Celeri
Arctostaphylos = Uva-Ursi
Asplenium acrostichoides = Athyrium
Astragalus (in part) = Geoprumnon
Bahia = Picradeniopsis
Berberis (in part) = Odostemon
Bidens (in part) = Megalodonta
Bignonia = Anisostichus
Bouteloua (in part) = Atheropogon
Brassica (in part) = Eruca
Brauneria = Echniacea
Breweria = Stylisma
Bronssonetia = Papyrius
Butneria = Calycanthus
Cactus = Coryphantha
Calophanes = Dyschoriste
Calypso = Cytherea
Carduus (in part) = Cirsium
Carex Fraseri = Cymophyllus
Cassia (in part) = Chamaecrista
Cassiope (in part) = Harrimanella
Cebathia = Epibaterium
Chrysopogon = Sorghastrum
Cladium = Mariscus
Claytonia (in part) = Crumocallis and Limnia
Clematis (in part) = Viorna
Cornus (in part) = Cynoxylon and Chamaepericlymenum
Coronopus = Carara
Cucurbita = Pepo
Cymopterus (in part) = Phellopterus
Cypripedium (in part) = Fissipes
Cystopteris = Filix
Dicksonia = Dennstaedtia
Dracocephalum (in part) = Moldavica
Dryopteris (in part) = Polystichum
Dupatya = Syngonanthus
Dysodia = Boebera
Eatonia = Sphenopholis
Echinocactus = Pediocactus
Eclipta = Verbesina
Elymus (in part) = Sitanion
Elyna (in part) = Kobresia
Eragrostis (in part) = Acamptoclados
Erianthus (in part) = Coelorachis
Eriocarpum = Sideranthus
Erysimum (in part) = Cheirinia
Erythraea = Centaurium
Euphorbia = Chamaesyce, Zygophyllidium, Dicrophyllum, Tithymalopsis, Tithymalus and Poinsettia
Gentiana = Dasystephana
Geranium (in part) = Robertiella
Gerardia = Agalinis and Otophylla
Geum (in part) = Sieversia
Gratiola (in part) = Sophronanthe
Gyrostachys = Ibidium
Habenaria = Perularia, Coeloglossum, Gymnadeniopsis, Limnorchis, Lysias, Lysiella and Blephariglottis
Helianthemum = Crocanthemum
Holcus = Notholcus
Illicoides = Nemopanthus
Ixophorus = Chaetochloa
Jatropha = Cnidoscolus
Kalmia (in part) = Kalmiella
Kuhnistera = Petalostemum
Legouzia = Specularia
Leontodon = Apargia
Leptorchis = Liparis
Leucothoë (in part) = Eubotrys
Limnanthemum = Nymphoides
Linum (in part) = Cathartolinum
Listera = Ophrys
Lotus (in part) = Hosackia
Malapoenna = Glabraria

* Some of these changes were made in Dr. Britton's Manual, some in his tree book, some in the North American Flora, some by various and sundry authors in the past, and many are here proposed for the first time. All are wholly new to the Illustrated Flora.

Mentzelia (in part) = Nuttallia
Mohrodendron = Halesia
Monniera = Bramia, Hydrotrida and Mecardonia
Onagra = Oenothera
Onoclea = Matteucia
Orchis (in part) = Galeorchis
Oxalis (in part) = Ionoxalis and Xanthoxalis
Oxygraphis = Halerpestes
Panicum (in part) = Echinochloa
Pedicularis (in part) = Elephantella
Phegopteris = Dryopteris
Picradenia = Tetraneuris and Hymenoxis
Pieris (in part) = Neopieris
Pogonia (in part) = Isotria and Triphora
Polygonum (in part) = Tovaria, Persicaria, Bistorta, Tracaulon, Tiniaria and Pleuropterus
Polypteris = Othake
Polytaenia = Pleiotaenia
Potentilla (in part) = Sibbaldiopsis
Prunus (in part) = Padus
Pteris = Pteridium
Rhus (in part) = Schmaltzia and Toxicodendron
Ribes (in part) = Grossularia
Roripa = Radicula, Armoracia and Neobeckia
Rudbeckia (in part) = Dracopsis
Rynchosia = Dolicholus
Sanguisorba (in part) = Poteridium and Poterium
Saxifraga (in part) = Antiphylla, Leptasea, Micranthes, Muscaria, Chondrosea and Hydatica
Scabiosa (in part) = Succisa
Scolopendrium = Phyllitis
Sedum (in part) = Rhodiola
Sisymbrium (in part) = Norta
Sorghum = Holcus
Sphaeralcea = Phymosia
Spiesia = Oxytropis
Stenophragma = Arabidopsis
Taraxacum = Leontodon
Tecoma = Bignonia
Tetragonanthus = Halenia
Tillaea = Tillaeastrum
Tillandsia = Dendropogon
Tofieldia (in part) = Triantha
Tradescantia (in part) = Cuthbertia
Tunica = Petrorhagia
Ulmaria = Filipendula
Utricularia (in part) = Vesiculina, Lecticula, Setiscapella and Stomoisia
Vaccinium (in part) = Vitis-Idaea
Verbesina = Ridan, Phaethusa and Ximensia
Willughbaeya = Mikania
Woodwardia = Anchistea and Lorinseria
Wulfenia = Synthyris
Zephyranthes = Atamosco
Zygadenus (in part) = Anticlea, Toxicoscordion and Oceanorus

Perhaps some of us will grieve just a little wistfully at the passing of old friends like *Polygonum*, *Gentiana*, *Gerardia*, *Tecoma*, *Taraxacum*, *Apium*, *Apios* and many others. The death of more recent acquaintances, for whom many never cherished any really passionate longing, like *Adopogon*, *Adicea*, *Brauneria*, *Limnanthemum*, *Onagra* and a host of others, will be mourned more calmly.

Those with carefully written up collections and herbaria will be among the number to greet the hundreds of changes necessary in *specific* names contingent upon the above list, with mingled feelings. But nothing comes of stagnation, much by devoted effort, nothing of intellectual indolence, much by activity, and let the disgruntled keepers of herbaria and the like, say with Kipling, cheerfully, even gratefully,

> "Many ways Thou has fashioned: All of them lead to the Light."

If Light in this connection postulates stability of nomenclature,

most of us would welcome twice the changes proposed in the present work. For we have all, these many years, been clutching rather wildly, sometimes almost deliriously, at what we hoped was Light.

Lack of space forbids a discussion of the many interesting points that have arisen in a study of these three volumes. The placing of *Uvularia* in Convallariaceae, and the failure to take up *Oakesia* for *Uvularia sessilifolia*, are significant features. Again, the splitting up of the old pink family into Corrigiolaceae, Alsinaceae and Caryophyllaceae, and the position of the first of these before Nyctaginaceae are quite in line with modern ideas as to the affinities of these groups. Dr. Britton has not maintained the genus *Negundo*, which has had some adherents in this country and on the continent. Indeed the failure to maintain this genus and a few more doubtful propositions of the same sort, together with the quelching of trinomials, are practically the only reactionary tendencies in a work, otherwise almost wholly modern.

Mention should be made of the thousands of English and vernacular names, all carefully indexed, many of them an integral part of the outdoor vocabulary of different sections of the country. This most useful feature of the volumes is mostly the work of the late Judge Brown, whose death, pathetically enough, occurred six weeks before the book was finally published, and only a few days before bound copies of the book were ready.

The illustrations, binding (red) and press work are of a high order, coming up in every way to the excellent standard set by the first edition. The scheme of printing the index on specially heavy paper is an excellent protection for a much used section of the book. I have noticed only one error in the index, where Hippocastanaceae is referred to **1**: 498 instead of to volume two, the same page.

In conclusion it may be said that the work is a sincere and devoted attempt to bring our knowledge of the flora in eastern North America up to date. It is an unusually successful effort to combine all that the authors have stood for in the advancement of systematic botany in this country. Only the heartiest

congratulations are to be extended to Dr. Britton, to whom the chief labor has fallen, upon the accomplishment of a task fitting in every way to be a permanent record of his life-long study of our flora.

NORMAN TAYLOR

PROCEEDINGS OF THE CLUB

APRIL 30, 1913

The meeting of April 30, 1913, was held in the laboratory of the New York Botanical Garden at 3:30 P.M. Vice-president Barnhart occupied the chair. Eighteen persons were present.

The minutes of March 26 and April 8 were read and approved.

The Committee on Exchanges, consisting of Dr. W. D. Johnston and Dr. J. H. Barnhart, submitted their annual report, which was adopted. The report showed that the following exchanges had been arranged for 1912–1913:

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Bulletin and TORREYA	1

The resignations of Mrs. A. D. Russell and Mrs. Wm. Mitchell were read and accepted.

Dr. Barnhart announced the death of Hon. Addison Brown who was at one time President of the Club. On the motion of Dr. Britton a committee consisting of Prof. E. S. Burgess, Dr. H. H. Rusby, and Dr. J. K. Small was appointed with power to prepare a suitable memorial of Judge Brown.

The first number on the announced scientific program consisted of a paper on "Local Flora Notes" by Mr. Norman Taylor. Mr. Taylor gave a short account of his studies on the relationship of the flora of Long Island, Staten Island, and the New Jersey pine-barrens. Lists of species were given that are found only on Long Island and the New Jersey Coastal plain but not on Staten Island, and also lists of plants found on Staten Island but not on Long Island. Mention was also made by the speaker of the discovery by Miss Mulford at Arkville of the musk-root.

Mr. Taylor also spoke briefly of a recent visit to Alphano, Warren Co., N. J., where a corporation is engaged in the exploitation of the sediment of an inter-glacial lake, the old bed of which is covered by a deposit of muck or humus, which is not sour and yields a large amount of plant food. Mention was made of the great phytogeographic interest of the spot, and a field trip to the locality was suggested.

The second paper was given by Prof. H. M. Richards on "Respiration and Acidity in *Cacti.*"

In common with many other succulents cacti show a high acidity. The acids present are considered to be malic or iso-malic. It has been known that this acidity diminishes during the day and increases at night. The maximum is just before sunrise and the minimum at about five o'clock in the afternoon when the temperature and light are lessening in intensity. In comparison with the diurnal temperature curve with the cactus joint that of the acidity is very nearly the reverse. But the fall in acidity is not due to a temperature effect alone, as is shown by the exposure of the cacti to bright sunlight at a constant and relatively low temperature when there is a marked diminution in the acidity. In atmospheres with increased partial pressure of oxygen the acidity diminishes more rapidly while in atmospheres devoid of oxygen it usually remains stationary or even increases.

The highest acidity found was where the pure juice was equivalent to nearly one fifth normal alkali. The greatest extremes between day and night showed the acidity at its minimum to be approximately one tenth of its maximum strength. There are considerable individual differences in different plants and the range of acidity is by no means always so great. Long joints still bearing leaves showed the highest acidity. Old turgid joints differed very little whether one, two, or three years old. Old flaccid joints showed the lowest acidity.

The respiration is naturally greatly affected by the rising temperature. It is highest at between 45° and 50° C. after which the CO_2 evolution gradually falls off and practically ceases above 60° C. The evolution of CO_2 after the maximum may

very well be simply due to the driving off of imprisoned gas. The respiration curve lags behind the temperature curve from an hour to an hour and a half. Even in bright sunlight there is still a considerable evolution of CO_2; at least when the temperature is above 40° C. It is well known that in the gas interchange succulents in general show a correspondingly lower absorption of oxygen than evolution of carbon dioxide. This is especially true of the older joints while the younger ones seem to behave more like ordinary plants in regard to the CO_2/O_2 ratio. But external conditions affect the relative amounts of gases involved. In general at higher temperatures the ratio is more nearly 1/1, while at lower temperatures the carbon dioxide evolution rapidly decreases, though the oxygen consumption remains nearly stationary. This part of the work is being done by Miss M. E. Latham and a large amount of data has been secured but not yet reduced for comparison. *Opuntia versicolor* was mainly employed because it happens to be especially favorable for experimental purposes, but other forms were used in part. The work has been partly carried on in New York and partly at Tucson, Arizona.

Meeting adjourned.

B. O. Dodge,
Secretary.

NEWS ITEMS

It is stated in *Österreichische Botanische Zeitschrift* (May) that Professor Dr. Hans Molisch, director of the Plant Physiology Institute at the University of Vienna, has been invested with the Order of the Iron Crown.

C. R. Orcutt, of San Diego, California, sailed for Mazatlan, Mexico, July 2, 1913, and plans to make botanical collections during the season in Lower California.

The following descriptive floras have just been issued by Dr. J. K. Small: Flora of the Southeastern United States: Second Edition, revised and enlarged. Flora of Miami: Contains descriptions of the seed-plants growing naturally in the Everglades,

southern peninsular Florida, with analytical keys to the species and higher plant-groups. Habitats and extra-limital geographical distribution for the Florida Keys and West Indies are given. Flora of Lancaster County: Contains descriptions of the seed-plants growing naturally in Lancaster County, Pennsylvania. A field-book with analytical keys to the species and higher plant-groups, habitats, and geographical and geological distribution of species. (In collaboration with J. J. CARTER.) Florida Trees: A hand-book of the native and naturalized trees of Florida, with analytical keys to the species and higher plant-groups, notes on the habitats, and geographical distribution within the state, and reference to the continental and West Indian distribution of the species. Flora of the Florida Keys: Contains descriptions of the seed-plants growing naturally on the islands of the Florida reef, from Virginia Key to Tortugas, with analytical keys to the species and higher plant-groups, habitats of the species, and geographical distribution, and reference to the occurrence of the species on the Everglade Keys and in the West Indies. Shrubs of Florida: A hand-book containing descriptions of the native and naturalized shrubs of Florida, with analytical keys to the species and higher plant-groups, also habitats and geographical distribution of the species within the state, and reference to the occurrence of the species on continental North America and in the West Indies.

At the Brooklyn Botanic Garden contractors began work about July 1 on the construction of an addition to the greenhouses, also grading operations for the garden were started by another firm of contractors. Permanent planting operations will follow this work, probably in the autumn, when it is hoped the installation of the general systematic outdoor collections will be started.

Dr. C. B. Robinson, of the botanical staff of the Bureau of Science, Manila, left Manila on June 17 enroute to Amboina via Singapore and Buitenzorg. The object of Dr. Robinson's trip is to make a thorough botanical exploration of Amboina with view to collecting ample material that shall serve to illus-

trate by actual specimens the species figured by Rumphius in his "Herbarium Amboinense" (1741–55). Many of Rumphius' figures are crude, and as these have been the basis of many species proposed by Linnaeus, Roxburgh, and other authors, it has, in many cases, proved to be impossible properly to interpret such species from Rumphius' figures alone. In many cases actual specimens from Amboina are necessary. Dr. Robinson plans to spend about 6 months in Amboina and in the neighboring islands. He has the coöperation and assistance of the Dutch botanists at Buitenzorg, Java. The material collected will later be distributed by the Bureau of Science in numbered sets to various botanical institutions with reference both to the names under which the plants were described and figured by Rumphius, and to modern nomenclature.

Professor F. H. Knowlton, of Washington, and Dr. Edward W. Berry, of the Johns Hopkins University, are spending July and August in the Rocky Mountains in paleobotanical work for the United States Geological Survey.

Dr. F. D. Kern has resigned his position at Purdue University to accept one as plant pathologist at the Pennsylvania State College.

Dr. Ira D. Cardiff, head of the department of botany in Washington State College and plant physiologist for the Experiment Station, has been appointed director of the Experiment Station. He will still remain head of the department of botany in the College.

A. B. Massey (B.S., N. C. A. and M. College 1909), for the past four years assistant professor of botany and bacteriology at Clemson College, has been appointed assistant professor of botany at Alabama Polytechnic Institute, Auburn, Ala., and will enter upon his work there September 10. Professor Massey is working in the laboratories of plant physiology at the University of Chicago for the summer.

Mr. Guy West Wilson has been appointed special agent of the U. S. Bureau of Plant Industry, to study the bark disease of the chestnut. He will be associated with Dr. Mel T. Cook,

Rutgers College, New Brunswick, N. J. At the same institution Mr. H. Clay Lint, M.S. 1912 Kansas Agricultural College, has accepted the Industrial Fellowship in plant pathology, which has been recently established.

Dr. Emil P. Sandsten has resigned the professorship of horticulture in Alabama Polytechnic Institute to accept a similar position in Colorado State College, where he began work August 1.

On July 27 the members of the international phytogeographic excursion, under the direction of Dr. H. C. Cowles, began active work by a visit to the Brooklyn Botanic Garden in the morning and the Hempstead plains in the afternoon. The next two days were spent in the pine-barrens of New Jersey, and on Wednesday, July 30, the New York Botanical Garden and Columbia University were visited. Many local botanists participated in these trips, also some Philadelphia botanists went on the pine-barren trip. The excursion left on Wednesday evening to return about the end of September, after touring most of the United States.

The honorary degree of master of arts has been conferred by Harvard University upon Mr. Alfred Rehder, of the Arnold Arboretum.

Professor A. S. Hitchcock, of the United States Department of Agriculture, is spending the months of July and August in field work in Arizona, Nevada and Utah.

The address of the editor of TORREYA during August will be Howe's Cave, Schoharie Co., N. Y., thereafter as usual.

The Torrey Botanical Club

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*Died February 1, 1913.

OTHER PUBLICATIONS

OF THE

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(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 39 published in 1912, contained 630 pages of text and 45 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 24–37 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–39 three dollars each.

Single copies (30 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–13 are now completed; Nos. 1 and 2 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

DR. BERNARD O. DODGE
Columbia University
New York City

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A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

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TORREYA

September, 1913.

Vol. 13 No. 9

THE VEGETATION OF CONNECTICUT

II. Virgin Forests

By George E. Nichols

In many respects the attitude of the forester toward a forest is radically opposed to that of the ecologist. To the former it represents merely the means to an end, to the latter it is the end in itself. The fundamental idea—the keynote, as it were—in the forester's treatment of the forest is utility. He estimates the value of a tract of woodland in board feet. His chief ambition is to secure a maximum yield per acre of the most desirable lumber. He regards the sawmill as the logical destination of every healthy tree. To him an over mature stand of heart-rotted veterans is an eyesore—they should be felled without delay in order to provide more space for younger generations. The ecologist, on the other hand, sees in such a group of trees the glorious consummation of long centuries of slow upbuilding on the part of Mother Nature. They represent the survivors of that keen competition and relentless struggle for existence to which their less fit comrades of earlier years have long since succumbed. To precipitate their downfall with the axe seems little short of desecration. Although forced to admit the economic necessity for the objective point of view of the forester, the viewpoint of the ecologist is mainly subjective. His interest in the forest is purely scientific, and anything which interferes with the normal consummation of natural laws is deprecated. Thus it is that the writer regards as a calamity the destruction during the past year of virtually the last remnant of the once vast primeval forests of this state.

At the time of its settlement, early in the seventeenth century,

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practically the entire state of Connecticut was densely wooded. Certain areas, of course, such as salt marshes and lakes, together with many swamps, rocky ridges, and sand plains, have never been covered by forests, and even before the advent of civilization there were doubtless considerable tracts, at least in the lowland, which in a more or less primitive way had been brought under cultivation. Almost the first task that confronted the settler was to dispose of the forest, and the work of destruction then inaugurated has continued almost incessantly for nearly three centuries. To be sure, the indiscriminate devastation which characterized the pioneer days was gradually discontinued when timber began to acquire a merchantable value, and in the Colonial period the forest resources of the state were a potent factor in the success of shipbuilding and other local industries. Even today there are numerous important lines of manufacture, notably that of brass, which owe their supremacy largely to the ready availability of a cheap, abundant, and constant supply of fuel wood. In the days of the stationary sawmill many tracts of virgin timber in the more inaccessible localities were left unscathed, and as late as the middle of the last century there was doubtless a considerable portion of the native forest that never had been encroached upon. But with the introduction of the portable sawmill and the improvement of transportation facilities, together with the increasing demand for timber, these remnants have rapidly disappeared, until at the present time there remain scarcely half a dozen patches of reputedly virgin forest, hardly one of which covers an area of more than a dozen acres. It must not be concluded, *a priori*, that the forests as such have actually been demolished, for it is estimated* that nearly half the total area of the state is still wooded. As a matter of fact, owing to the abandonment of unprofitable farmlands, the percentage of woodland has actually increased during the past few decades. But the woodlands of today are "second-growth" and may represent crops first, second, third, or even farther removed from the original stands. The probable relationship

* Frothingham, E. H. Second-growth hardwoods in Connecticut. U. S. Dept. Agr. Forest Service Bull. 96: 12. 1912.

between second growth forests and those from which they have been derived is discussed in a later paragraph.

The principal object of this paper is to place on record a series of observations made in the Carrington Phelps forest at Colebrook, a magnificent stand of virgin timber fully 300 acres in extent which has been referred to by Hawes* as the most perfect admixture of the northern and southern New England forest types he had ever seen. Unlike most Connecticut forests it, until recently, not only had remained practically unmolested by the lumberman, but it also seems to have been singularly immune from devastation by fire, the greater part of the area apparently not having been burned over for nearly three centuries. Without doubt this tract represented the type of climax forest which formerly prevailed over at least the greater part of northwestern Connecticut and on this account it is of peculiar interest. It was first brought to the writer's attention during the summer of 1911 and at that time a cursory survey was made. Since then several visits have been paid to the vicinity, the latest one shortly before the completion of the present paper, and the area has been carefully studied. Unfortunately extensive lumbering operations commenced early in 1912, so that at the present writing the greater portion of the forest has been reduced to treeless stumps, heaps of brush, and piles of sawdust.

As throughout most of Litchfield County the topography of the region concerned is very uneven and the elevations high. The forest was located partly in a rather broad valley, partly on the slopes of adjoining hills. The surface soil is of glacial origin, a sandy loam, often rocky, beneath which at varying depths is a substructure of precambrian gneiss which frequently outcrops at higher levels. A sizeable stream traverses the valley and in certain sections the ground is swampy. These swampy areas will not be considered here. On the whole the soil is well drained, although there is naturally more or less contrast in this respect between the slopes and the leveler valley floor. The surface of the ground is covered with a layer of humus which varies in thickness from 5 to nearly 30 centimeters.

* Hawes, A. F., and Hawley, R. C. Forest survey of Litchfield and New Haven Counties, Connecticut. Conn. Agr. Exp. Sta. Bull. 162: 16. 1909.

Of the more than a dozen trees which enter into the composition of the Colebrook forest two species, *Tsuga canadensis* and *Fagus grandifolia*, stand preëminent.* On the whole these are

FIG. 1. Interior view of Colebrook forest. To right of center is a typical example of a "stag-headed" hemlock.

about equally abundant and, taken together, comprise at least 55 per cent. of the entire stand. Of course the relative proportions of the two vary locally, but almost without exception one or the

* For the sake of convenience the present tense is used largely throughout the following description.

other is dominant. In some low sites hemlock includes more than 75 per cent. of the stand. The remainder of the forest is made up approximately as follows: *Acer Saccharum*—12 per cent. of the total number of trees; *Betula lutea*—10 per cent.; *Quercus rubrum*—6 per cent.; *Castanea dentata*—6 per cent.; *Fraxinus americana* and *Tilia americana*—7 per cent.; *Prunus serotina, Betula lenta, Acer rubrum,* and *Pinus Strobus*—4 per cent. For the most part the foregoing species occur scattered more or less indiscriminately through the forest, interspersed amid hemlock and beech. Chestnut, however, is somewhat localized, being more abundant on certain upland slopes than elsewhere.

Perhaps the most impressive feature of a virgin forest such as this is the great size attained by the mature trees. Their massive boles, from 60 cm. to more than a meter in diameter at breast height, and towering upward to a height of from 27 to more than 33 m., are usually clear of branches for a distance of from 12 to 18 m. from the ground, a fact which serves to accentuate their immensity. At 33 m. or less, height growth usually, though not invariably, ceases and commonly the trees become "stag-headed" (fig. 1). But growth in thickness continued so that the trunks wax more and more bulky with age. Thus, in a typical instance, it was found that the trunk of a hemlock 32 m. in height exhibited the following diameter measurements at the indicated distances above the ground: height 75 cm.—diameter 80 x 90 cm.; 8 m. —65 cm.; 16 m.—60 cm.; 24 m.—40 cm.; 27 m.—20 cm. A series of measurements and annual ring counts were taken with a view of ascertaining as nearly as possible the size and age attained by various trees in the original forests, and on a basis of these hemlock would seem to have included the oldest and most of the largest trees in the present stand. For this species the average diameter of mature specimens is nearly 90 cm., while three stumps (height about 60 cm.) having diameters of 150, 127 (fig. 2), and 115 cm., respectively, were noted. The majority of trees with a diameter of more than 90 cm. are rotten at the heart. The average age of mature trees is about 275 years, but a maximum was observed of about 350 years. As might be anticipated, there is no exact correspondence between age and trunk diameter.

Thus two trees having diameters of 1.25 and 15 cm. and heights of 1 and 7 m. respectively were each found to be 25 years old. Similarly in the case of two specimens each of which measured 77 cm. in diameter at the age of 250 years, the diameters at 50

FIG. 2. Interior view of Colebrook forest. Hemlock and beech. Underbrush composed of laurel and hobble bush.

years were 3.1 and 22.5 cm. respectively. This disparity is of course to be correlated with environmental conditions, especially with the degree of shade or exposure to which the young trees

have been subjected. A striking illustration of the effect of early shading and subsequent cover removal is afforded by one tree which at the age of 125 years had acquired a diameter of scarcely 14 cm. At this time (1781) a fire resulted in the removal of many of its neighbors and growth became so accelerated that during the succeeding 17 years its trunk more than doubled in thickness. In general, shade-grown trees appear to have been suppressed for a period of from 100 to 150 years and at that age possess scarcely one third the diameter of trees grown under more favorable conditions. Accelerated diameter growth is the natural result of increased exposure to light, which may be brought about either by the continued upward growth of the individual concerned or through the death of surrounding trees. The largest beech observed measured about 85 cm. in diameter. Several 60 cm. specimens were found to be from 200 to 225 years in age. Sugar maples with a diameter of more than 75 cm. are frequent, the largest individual measured being about 105 cm. thick. Such trees are from 250 to 300 years old. Red oak also attains great size and antiquity, a few specimens fully a meter in diameter and 300 years old being noted. Yellow birch commonly acquires a diameter of 75 cm., and one large individual measured more than 3 m. in circumference. Nowhere in the state has the writer observed such magnificent chestnuts as here. The largest trunk seen had a diameter of 132 cm., while trees 75–100 cm. in diameter, 30 m. high, and branchless to a distance of 15 m. from the ground are quite frequent in certain localities. Chestnut usually grows rapidly, and the largest individuals observed had not yet reached the age of 150 years. Ash, basswood, and cherry likewise grow to large size, while among the most imposing trees of the entire forest are a few tall pines which rise to a height of more than 35 m.

But while these aged veterans form the conspicuous part of the forest they by no means constitute a plurality. For as in most virgin woodlands the stand here is of uneven age so that every stage in development and deterioration is present—from the slender saplings to the rotting logs with which the ground is strewn on all sides. It is of import to note that the character of

the seedlings is essentially the same as that of the adult trees, a fact which would indicate that the present type of forest is naturally self-perpetuating and therefore permanent.

Though not, perhaps, quite so spectacular as the arborescent portion of the forest, yet to one accustomed to the omnipresent *Kalmia latifolia-Gaylussacia baccata-Rhododendron nudiflorum* thickets of the ordinary Connecticut woodlands the luxuriance of the underbrush here is a revelation. As elsewhere, to be sure, laurel is an important constituent, but along with this occur in profusion two other shrubs which even in northern Connecticut are seldom encountered in second-growth forests, viz., *Viburnum alnifolium* and *Taxus canadensis.* The usual failure of these plants to survive the effects of lumbering is doubtless due to their extreme mesophytism and shallow root systems. The yew is much commoner in the lower grounds than on the drier slopes and frequently preëmpts considerable patches to the exclusion of all other undergrowth. *Hamamelis virginiana, Viburnum acerifolium, Cornus alternifolia,* and *Lonicera canadensis* are not infrequent, while *Sambucus racemosa* occurs locally. Associated with these shrubs and occasionally forming a distinct stratum or story of vegetation are two small trees, *Acer pennsylvanicum* and *Acer spicatum.* These rarely attain a height of more than 6 m. with a diameter of 15 cm. and, like the hobble bush, are characterized by their broad, thin, mesophytic leaves. Seedlings of the various larger trees also constitute a significant part of the underbrush, and the high degree of mesophytism in such a forest is emphasized by the fact that these often germinate luxuriantly upon rotting logs and decaying stumps, a phenomenon seldom witnessed in the more xerophytic second-growth woodlands. In a forest similar to this one, at Sheffield, Massachusetts, the writer counted more than a hundred seedlings of hemlock and yellow birch flourishing on a 15 meter log.

In view of the richness of the substratum the number of species of herbaceous vascular plants native to the Colebrook forest at first thought seems surprisingly small. This paucity may doubtless be attributed to the lack of environmental diversity, coupled with the inability of any but tolerant species to endure the deep

shade of the forest floor. In many parts of the tract the moldy soil appears almost devoid of plant life over considerable areas, while in densely brushed places herbaceous vegetation is invariably sparse. The following list includes all the pteridophytes and herbaceous spermatophytes that have been observed by the writer during his several visits to the forest.

Polypodium vulgare
Phegopteris polypodioides
Asplenium acrostichoides
Asplenium Filix-foemina
Polystichum acrostichoides
Aspidium noveboracense
Aspidium spinulosum intermedium
Botrychium virginianum
Lycopodium lucidulum
Lycopodium obscurum
Brachyelytrum erectum
Festuca nutans
Carex Deweyana
Carex gracillima
Carex communis
Carex varia
Carex pennsylvanica
Carex laxiflora patulifolia
Carex arctata
Arisaema triphyllum
Clintonia borealis
Smilacina racemosa
Maianthemum canadense
Streptopus roseus
Medeola virginiana
Trillium undulatum
Cypripedium acaule
Habenaria macrophylla
Epipactis pubescens
Coptis trifolia
Actaea alba
Caulophyllum thalictroides
Tiarella cordifolia
Mitella diphylla
Dalibarda repens
Oxalis Acetosella
Viola rotundifolia
Circaea alpina
Aralia racemosa
Aralia nudicaulis
Osmorhiza Claytoni
Chimaphila umbellata
Pyrola chlorantha
Pyrola elliptica
Monotropa uniflora
Gaultheria procumbens
Trientalis americana
Epifagus virginiana
Mitchella repens
Solidago caesia
Aster divaricatus
Aster lateriflorus
Aster acuminatus
Prenanthes sp.

Of the plants above listed the greater number are rather widely distributed throughout the tract. Two of the most representative forms are shown in fig. 3. Some species, as for example *Phegopteris polypodioides*, *Arisaema triphyllum*, *Clintonia borealis* and *Coptis trifolia*, are characteristic of low woods. *Lycopodium lucidulum* is particularly abundant in such sites, where with the

yew it often forms a dense carpet over the surface of the ground. Others are restricted to upland woods, *e. g.*, *Festuca nutans*, *Carex Deweyana*, *Carex arctata*, and *Pyrola chlorantha*. A few, such as *Cypripedium acaule*, *Caulophyllum thalictroides* and *Dalibarda repens*, are quite local in their occurrence. The scarcity of autumn flowering plants is remarkable. In late September almost the only conspicuous form in blossom is *Aster divaricatus*.

FIG. 3. *Oxalis Acetosella* (in flower) and *Tiarella cordifolia* (in fruit). Colebrook forest.

Hardly less striking is the relative abundance of northern species which elsewhere in the state are either absent or confined to cool ravines. *Habenaria macrophylla*, for example, has been definitely recorded from but one other Connecticut locality, yet here it is not infrequent, though rare in flower.

No one feature better suggests the intense mesophytism of this forest than the character and distribution of the bryophytes. Not only do these commonly form a rich covering over the

surface of the ground, on roots, logs, stumps, and bowlders, but they also plaster the bases of trees, extending up their trunks to a height of 24 meters. Maple, birch, and beech particularly are thus covered while, as a rule, hemlock is singularly immune from epiphytes of any description. The more prevalent mosses and liverworts observed may be classified roughly according to habitat as follows.

Growing on the ground, roots, logs, or stumps:

Cephalozia curvifolia
Cephalozia media
Cephalozia serriflora
Bazzania trilobata
Dicranum scoparium
Dicranum flagellare
Dicranum montanum
Dicranum viride
Dicranella heteromalla
Leucobryum glaucum
Mnium cuspidatum
Aulacomnium heterostichum
Anomodon attenuatus
Thuidium recognitum
Thuidium delicatulum
Brachythecium sp.
Rhynchostegium serrulatum
Stereodon imponens
Stereodon cupressiformis
Stereodon fertilis
Heterophyllon Haldanianum
Georgia pellucida
Catharinaea undulata
Polytrichum ohioense

Growing on rocks and bowlders:

Metzgeria furcata
Scapania nemorosa
Lejeunea cavifolia
Dicranum fulvum
Fissidens adiantoides
Grimmia apocarpa
Ulota Hutchinsiae
Bryum capillare
Hedwigia albicans
Entodon cladorrhizans
Anomodon attenuatus
Anomodon rostratus
Pterigynandrum filiforme
Thuidium recognitum
Brachythecium oxycladon
Brachythecium populeum
Sematophyllum tenuirostre
Isopterygium elegans
Plagiothecium denticulatum
Amblystegiella adnata

Growing on trunks of trees:

Metzgeria furcata
Radula complanata
Porella platyphylla
Cololejeunea Biddlecomiae
Frullania Asagrayana
Orthotrichum sp.
Drummondia clavellata
Ulota ulophylla
Leucodon brachypus
Forsstroemia trichomitria
Neckera pennata
Haplohymenium triste
Platygyrium repens
Pylaisia Schimperi

Growing on bases of trees:

Dicranum flagellare	*Anomodon rostratus*
Anomodon attenuatus	*Rauia scita*

Also most of the species in the preceding list.

General problems relating to the phenomena of plant succession are to be discussed in later papers. Because, however, of their bearing on the broader question of the relationship between the forests of the present and those of the past it seems advisable in the present connection to call attention briefly to certain facts deduced from a study of second-growth woodlands at Colebrook, in localities which almost certainly were once occupied by forests similar to the one above depicted. In the majority of cases such tracts are less mesophytic than the original forest, as is evidenced by the usual presence of *Betula alba papyrifera* and *Pinus Strobus* as character trees, together often with *Carya ovata* and *Carya glabra*. The proportion of chestnut and red oak is greater here than in the virgin forest while hemlock is ordinarily much less abundant. The increased percentage of the two species first mentioned is doubtless, in large part, to be accounted for by their well known prolific sprouting capacity. One striking example of the propensity of chestnut to reproduce in this manner was noted by the writer where a single 75 centimeter stump had given rise to more than 375 coppice shoots. Apropos it may be remarked that, according to Frothingham,* much the greater part of the present Connecticut forests have originated in this way, while recent estimates† show that chestnut today comprises fully 50 per cent. of the standing timber in the state. Like most conifers, hemlock fails to develop adventitious buds, and is consequently dependent entirely upon seed reproduction, a comparatively slow and uncertain method of propagation. The xerophytic proclivity of second-growth tracts is further reflected by the character of the undergrowth. The yew, hobble bush, and moosewood are sparser and may have vanished completely, while *Prunus pennsylvanica*, *Gaylussacia baccata*, and species of *Vaccinium* have made their appearance. Many of the her-

* Op. cit., p. 13.

† Frothingham, l. c.

baceous mesophytes also, like the twisted stalk, painted trillium, and wood sorrel, have disappeared, being supplanted in a measure by such plants as *Lycopodium complanatum*, *Lycopodium clavatum*, *Dicksonia punctilobula*, and *Pteris aquilina*, forms rarely seen in the original forest. Even the bryophytic flora has become greatly modified, mesophytic shade species having given way to forms such as *Polytrichum commune* and *Hypnum Schreberi*.

In many instances fire has unquestionably played an important rôle in the changes which have been wrought, for the hemlock with its shallow root system, rarely penetrating more than 50 centimeters below the surface, is much more susceptible to such a calamity than are deeper rooted trees. One notable instance of the effect which fire may have on the composition of a forest is afforded by a portion of the virgin tract above described which, as attested by numerous fire scars, was severely burned over in or about the years 1781 and 1794. In this plot of about 20 acres hemlock is practically lacking and most of the larger trees are chestnut. Of special interest is the fact that of more than a dozen chestnuts and red oaks whose age was ascertained, every one sprang into existence within five years after the last fire, presumably originating as coppice shoots.

But while in the majority of cases retrogression has taken place several second-growth tracts have been observed which in composition seem essentially identical with the original forest. Indeed in a few cases the proportion of hemlock has apparently increased. Such woodlands appear to be restricted to localities in which edaphic conditions are exceptionally congenial, *e. g.*, sheltered valleys, and where they have been protected from the ravages of fire. The presence of such unmodified areas is of importance, for it justifies the conclusion that although ordinarily the contemporaneous woodlands of Connecticut may not resemble the original forests, nevertheless in suitable sites and under favorable conditions the physiognomy of the forest may have remained practically unaltered. Finally, it should be remarked that no matter how far retrogression may have proceeded there is usually ample evidence afforded by the character of the seedlings that if left undisturbed a forest in most cases would slowly but surely revert to approximately the climax type.

With the eradication of the Colebrook forest Connecticut's primeval woodlands have become practically a thing of history, for the few vestiges of virgin timber that are still preserved serve as little more than poor reminders of the grandeur which the forests of the past must have possessed. Of the areas of this sort which have come to the writer's attention three are situated in the northwestern part of the state. One of these (fig. 4), on the estate of Mr. Carl Stoeckel at Norfolk, so far as it

FIG. 4. Beech in Norfolk forest.

goes is an almost exact counterpart of the Colebrook forest. Another is in the upper part of Sage's Ravine, a wild, picturesque spot in the town of Salisbury. Here hemlock and yellow birch are the prevailing trees, while moosewood, striped maple, yew, hobble bush, and laurel are abundant. The resemblance to the Colebrook forest is again noticeable, but an even higher degree of

mesophytism is attained. The third remnant in this part of the state is at Cornwall, the property of Mr. John Calhoun (fig. 5). This plot differs from any of the preceding in that the dominant tree is *Pinus Strobus*. Hawes* describes the trees in this group

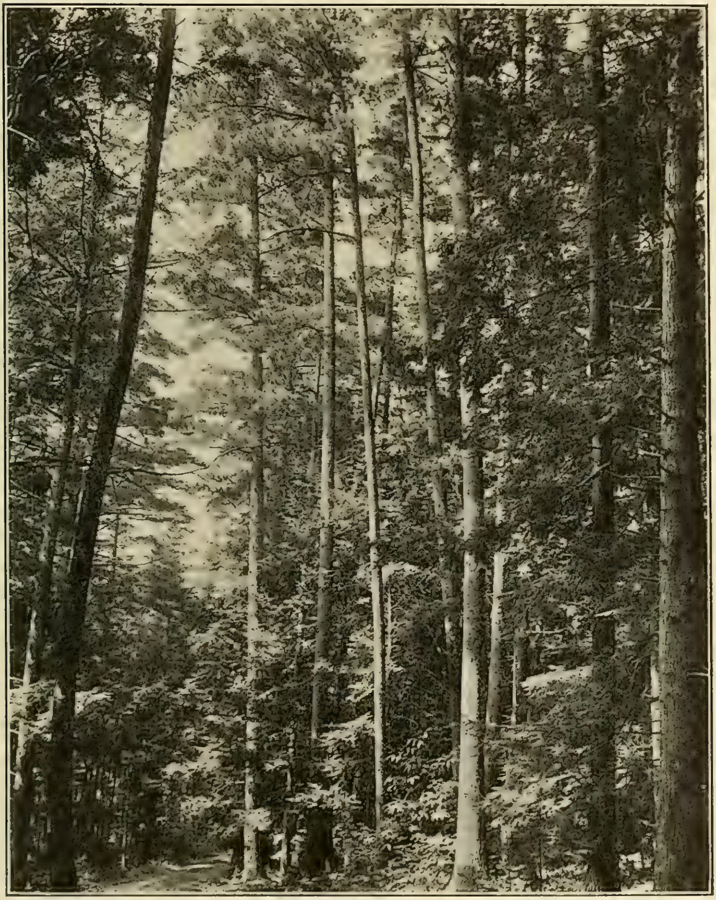

FIG. 5. Pine forest at Cornwall.

as "the most magnificent white pines that can be found in the East, fully equal to the best timber in the Lake States." Many of them tower up to a height of 45 meters and have diameters of nearly a meter. It is a significant fact, however, that although

* Op. cit., 16.

the pine includes most of the mature trees here, the rising generation is composed mainly of hemlock, with a sprinkling of sugar maple, yellow birch, beech, and other hardwoods. Obviously pine does not represent the ultimate type.

In northeastern Connecticut there are two forests which at least closely approximate the virgin state. The largest of these lies in the town of Woodstock, about three miles south of the Massachusetts state line, and is known locally as "Lawson's Pines." For the most part the area is covered with a mixed stand of large pine and hemlock, but in places the growth is almost pure pine. Chestnut, white oak (*Quercus alba*), and red oak are important secondary species, but beech is absent and yellow birch uncommon. A dense laurel tangle occupies most of the forest floor while tree seedlings are also present in greater or less abundance. White pine reproduction, however, is noticeably sparser than that of hemlock and hardwoods. The second tract is in the town of Pomfret, about half a mile from the station of Abington. The dominant trees here are chestnut, red oak, and white oak. Hemlock is not common and beech seems to be missing. Laurel, witch hazel, huckleberry, and pink azalea comprise much of the underbrush.

Southeastern Connecticut, so far as ascertained, possesses only one possible fragment of original forest and, notwithstanding the owner's assurance that the area has never been cut over, the writer must confess to some doubt as to the primeval nature of the tract. The area in question, some 40 acres in extent, occupies a low hill bordering the Sound at the mouth of the Pawcatuck River in the town of Stonington. In contrast to the forests heretofore described there is a complete absence of hemlock, beech, sugar maple, yellow birch, pine, and even chestnut. The character trees are white oak and black oak (*Quercus velutina*), especially the former, associated with which are shagbark hickory and red maple. The stand is of a more open character than in any of the areas previously mentioned and in general aspect the forest resembles the climax oak-hickory type of the Chicago region.* Trees with a diameter of from 45 to 60 centimeters

* See Cowles, H. C. The physiographic ecology of Chicago and vicinity. Bot. Gaz. **31**: 78 ff. 1901.

are common. The ground is not deeply shaded and the low, dense underbrush is quite xerophytic, being composed largely of *Gaylussacia baccata*, *Vaccinium corymbosum*, *Vaccinium stamineum*, and *Corylus americana*. It is of course not impossible that the xero-mesophytic nature of the tract is due to its extremely exposed location and that it really represents a virgin forest. Moreover it must be borne in mind that in general the forests of eastern Connecticut are less mesophytic than are those in other parts of the state.

No primeval tracts of undoubted authenticity have yet been discovered either in the central lowland or in southwestern Connecticut. There is, however, a small grove at the head of Lake Saltonstall, in East Haven, which is certainly very close to the virgin condition and which probably represents the type of forest that formerly prevailed along the lower slopes and moister parts of the trap ranges. Hemlock is the character tree here and associated with it are beech, chestnut, sugar maple, red oak, and ash. Many of the trees are of large dimensions. It seems not unlikely, also, that some of the sand plain forests of *Pinus rigida*, such as are common in the region about Farmington, may be virgin or nearly so. These will be referred to again in a later paper.

Yale University

FOUR UNDESCRIBED WEST INDIAN SEDGES

By N. L. Britton

Stenophyllus Wilsoni sp. nov.

Perennial by short stout rootstocks; culms clustered, somewhat flattened, smooth, stiff but rather slender, erect, 2–3 dm. tall. Basal sheaths 3 or 4, bladeless, acute, many-nerved, floccose-pubescent, the upper with a scarious margin. Spikelets 2–5 together in a terminal capitate cluster subtended by a subulate bract 0.5–2 cm. long, or sometimes by 2 bracts; spikelets linear-oblong, much compressed, 1–2 cm. long, 4 mm. wide; scales narrowly oblong to oblong-lanceolate, loosely pubescent,

ciliate, light brown, membranous, obtusish, 5 mm. long, 1.5 mm. wide, the midvein prominent. Stamens 3; style 3-cleft, the pubescent branches about as long as the glabrous lower part; achene obovoid, dull black, bluntly trigonous, nearly 1 mm. long, capped by a minute depressed tubercle.

BAHAMA ISLANDS: Castle Island, *Percy Wilson 7789*, Dec. 29, 1907 (type); West End, Little Inagua, *Percy Wilson 7778*.

Stenophyllus portoricensis sp. nov.

Densely tufted, perennial. Culms setaceous, slightly roughened, weak, spreading, glabrous, 2 dm. high or less, longer than the similar leaves; leaf-sheaths loosely pilose; spikelet solitary, linear, 5–8 mm. long, subtended by a setaceous bract 2–3 cm. long; lowest scale ovate, acute, 1 mm. long, the others lanceolate, acuminate, 2.5–3 mm. long; achene narrowly oblong-obovate, bluntly 3-angled with faces somewhat sunken, thickest a little above the middle, 1.3 mm. long, 0.5 mm. thick, irregularly roughened, tipped by a broad tubercle about 1.5 mm. high and wide.

Rocky coastal thicket near Guanica, Porto Rico, March 11, 12, 1913 (*Britton and Shafer 1916*).

Nearest related to the Cuban *S. floccosus* (Griseb.) Britton [*Scirpus floccosus* Griseb.; *Bulbostylis floccosa* Clarke] which is lower, with larger spikelets and smooth achenes.

Fimbristylis inaguensis sp. nov.

Perennial by short stout rootstocks; culms rather stout, stiff, smooth, compressed, 3–5 dm. tall. Basal leaves one-third to two-thirds as long as the culm, flat, rather stiff, smooth, 1–2.5 mm. wide, obtuse; leaves of the involucre 2–4, the longer one usually a little exceeding the inflorescence; umbel compound, 5–7 cm. broad, the rays 2–4 cm. long, ascending, the raylets slender, 0.5–2 cm. long; spikelets narrowly oblong, 8–12 mm. long, about 2.5 mm. thick, acute, many-flowered, solitary at the ends of the rays and raylets; scales brown, glabrous, dull, ovate, carinate, mucronate or the lower short-awned; achene elliptic or obovate-elliptic, flat, blunt, finely reticulated, nearly 1.5 mm. long; style-branches 2.

Bahama Islands: Whitelands and rocky soil, Cat Island, Little San Salvador, Watling's Island, Fortune Island, Crooked Island, Exuma Chain, Little Ambergris Cay; Inagua (*Nash and Taylor 1019*, type)—Cuban Cays.

Rynchospora bahamensis sp. nov.

Densely tufted, rootstocks short. Culms nearly filiform, roughish, spreading or reclining, 2–3.5 dm. long; leaves setaceous-flattened, less than 1 mm. wide, roughish-margined, the basal ones about one-fourth as long as the culm, the upper 3–5 cm. long; spikelets oblong, 1.5–2 mm. long, in 2 to 4 distant slender-peduncled clusters, each with a single achene; scales dark brown, ovate-oblong, mucronulate; achene elliptic-obovate, faintly transversally wrinkled, 1.5 mm. long; tubercle flattened, conic, one-third to one-half as long as the achene; bristles upwardly barbed, as long as the achene.

Bahama Islands: Coppice, Soldier's Road, New Providence (*Britton and Brace 588*, type); vicinity of Blue Hills, New Providence (*Wilson 8241*); mud holes of mangrove swamp, Deep Creek, Andros (*Brace 5195*).

A SUPPLEMENTARY LIST OF PLANTS OF COPAKE FALLS, N. Y.

By Stewart H. Burnham

In the June, 1913, number of Torreya appears Mr. Sereno Stetson's finely illustrated, long and interesting list of Copake Falls plants. Mr. Stetson remarks that his list "is by no means complete and is only intended to convey an idea of the flora." Two delightful afternoons were spent collecting and wandering about this picturesque gorge, known to many as Bash Bish Falls, August 1, 1908, and July 3, 1909: and as my field notes contain so many interesting species not listed by Mr. Stetson, it seemed best to arrange an additional list. Other northern and interesting plants should be found; for the list is still incomplete. Many interesting fungi, lichens and mosses were also collected on these afternoons. The station mentioned in this list as "Sunset

Rock," is the point which Mr. Stetson calls "Lookout Rock"; "Eagles Nest" and "Look-Off" are high rocks on the south bank of the gorge. The nomenclature of Gray's New Manual has been used, in order to keep uniformity in the two lists.

Pteridophytes

Polypodium vulgare L. Fairly common in rocky places.

Phegopteris polypodioides Fee. Frequent in moist shaded places.

Phegopteris Dryopteris (L.) Fee.

Pteris aquilina L. Roadside woods and open exposed situations.

Asplenium Trichomanes L. A small amount found in crevices of the rocks in the gorge.

Aspidium marginale (L.) Sw.

Aspidium spinulosum var. *intermedium* (Muhl.) D. C. Eaton. Both of these occur in the woods.

Cystopteris bulbifera (L.) Bernh. Crevices of rocks in the gorge.

Woodsia ilvensis (L.) R. Br. Sunset Rock.

Monocotyledones

Andropogon scoparius Mx. By the roadside.

Panicum latifolium L. Roadside thickets.

Muhlenbergia tenuiflora (Willd.) BSP. Rocky situations.

Agrostis hyemalis (Walt.) BSP. Dry rocks.

Glycera nervata (Willd.) Trin. Along the brook above the falls.

Hystrix patula Moench. Roadside woods in dry places.

Carex mirabilis Dew.

Carex brunnescens gracilior Britton.

Carex trisperma Dew. Sunset Rock.

Carex lurida Wahl. Not uncommon in wet places.

Luzula saltuensis Fernald.

Clintonia borealis (Ait.) Raf. Moist places in woods; in July the fruit is still young.

Dicotyledones

Myrica asplenifolia L. Exposed places.

Betula lenta L. Sunset Rock.

Betula lutea Mx. f.

Quercus prinus L. Probably the most common oak.

Quercus coccinea Muench. Vicinity of Sunset Rock.
Quercus ilicifolia Wang. Sunset Rock.
Sagina procumbens L. In moist places near the foot of the lower or Twin Fall.
Cerastium nutans Raf. In the gorge near the foot of Eagles Nest' finely fruited in August.
Clematis verticillaris DC. The upper end of the gorge, in fruit.
Actaea rubra (Ait.) Willd. Fruiting in August.
Liriodendron tulipifera L. A large tree near the railroad station; along the road small shrubs.
Arabis lyrata L. Rather common in the gorge in crevices of rocks: plants often in flower and fruit at the same time.
Arabis laevigata (Muhl.) Poir. Roadside.
Ribes prostratum L'Her. Moist mossy rocks.
Platanus occidentalis L. Along Bash Bish brook, large trees near the railroad station.
Pyrus melanocarpa (Mx.) Willd. Sunset Rock.
Pyrus americana (Marsh.) DC. Upper end of the gorge; fruiting in July.
Amelanchier canadensis (L.) Medic.
Rubus triflorus Richards. Low shaded woods.
Rosa blanda Ait.
Desmodium bracteosum (Mx.) DC. Roadside.
Oxalis acetosella L. Moist places in woods.
Acer pennsylvanicum L.
Acer spicatum Lam.
Viola rotundifolia Mx. Moist places in woods, fruiting in July.
Circaea alpina L. Moist shaded places near Twin Fall.
Aralia hispida Vent.
Cornus circinata L'Her.
Kalmia angustifolia L. Look-off Rock.
Apocynum cannabinum L. Roadside.
Asclepias phytolaccoides Pursh. Roadside.
Pycnanthemum incanum (L.) Kutze. Roadside.
Mentha gentilis L. Bash Bish brook above the gorge.
Viburnum alnifolium Marsh. Cool moist places in woods.
Helianthus divaricatus L. Roadside.

Hudson Falls, N. Y.

REVIEWS

Fertilizer Resources of the United States*

A volume issued a few months ago by the U. S. government as Senate Document No. 190, with the title "Fertilizer Resources of the United States," contains much that is of interest to botanists and more particularly to students of the plants that grow in the sea, although this fact might not be wholly obvious to one who should go no farther than its title-page. 162 of the 290 pages of text in this document, 11 of the 19 plates, and all of the 19 maps are devoted to the marine algae and more especially to the larger kelps of our Pacific Coast and to the possibilities of making a practical use of these kelps as a source of potash for the American farmer and gardener. Nearly all of the potash that goes into the commercial fertilizers used in the United States now comes from the Stassfurt region of Germany, a region that represents a former sea-bottom, where certain soluble potassium salts have accumulated in a solid form by the concentration and final drying out of the sea-water. The Stassfurt mines are at the present time the one important source of the potash supply of the world, and the United States now imports from Germany more than $12,000,000 worth of potash annually. Partly as a result of certain recent controversies between the German "Kali Syndikat" and American importers, the U. S. Congress instructed the Bureau of Soils of the Department of Agriculture and the U. S. Geological Survey to investigate the possibilities of discovering or developing within the boundaries of the United States a supply of potash that should be sufficient for the domestic needs. The first and most natural steps in this search for an independent American source of potash led to the alkaline basins of the arid West, especially where potassium salts in the surface "alkali" suggested the possibility of finding deposits of soluble potassium compounds comparable to those of the Stassfurt

* Fertilizer resources of the United States. Message from the President of the United States transmitting a letter from the Secretary of Agriculture, together with a preliminary report by the Bureau of Soils, on the fertilizer resources of the United States. Senate Document No. 190, 62d Congress, 2d Session. Pp. 1–290. *pl. 1–19 + maps 0–18.* Washington, 1912.

region of Germany, but thus far this search has not resulted in the discovery of any deposits of commercial importance, though borings, in certain localities, are still being carried on by the Geological Survey. The attention of the investigators has been seriously directed also to alunite, the feldspars, and the granitic rocks, into the composition of which potassium enters, but thus far the cost of separating out the potassium and converting it into a soluble form puts these rocks outside the lists of immediate economic sources of potash for the American farmer and gardener; however, alunite is looked upon as a promising possibility The Washington scientists in their search for a domestic supply of potash took into consideration also the long-established use of seaweeds as a fertilizer for the soil by farmers living in vicinity of the sea and the well-proven fact that the beneficial effects of seaweeds thus used are due chiefly to the potash that they contain. Under the direction of the Bureau of Soils, detailed surveys of the extensive kelp beds of our Pacific Coast, particularly of the Puget Sound region and the southern half of California, have been made, and the amount of kelp annually available as a source of potash has been computed. Analyses made by the chemists of the Department of Agriculture (J. W. Turrentine, Appendix P, The composition of kelps, pp. 217–221) show that the amount of potash contained by the marine algae varies greatly with the species, place of collection, age of the plant, the part analyzed, etc. The three Pacific kelps that occur in sufficient abundance to make them important as a possible source of potash are *Nereocystis*, *Macrocystis*, and *Pelagophycus*. Dr. Turrentine found that 48.85 per cent. of the dry weight of the bulb of a young *Pelagophycus* plant consisted of potassium chloride and that *Macrocystis*, *Nereocystis*, *Pelagophycus*, and *Postelsia* showed an average content of 23.4 per cent. potassium chloride. As a result of the analyses and the field surveys carried on under the direction of the Bureau of Soils, Hon. James Wilson, the recent secretary of agriculture, in his letter of transmittal of Senate Document 190 feels justified in remarking: "It is regarded as a very conservative estimate to put the annual yield of potassium chloride from the Pacific kelps at upward of 1,000,000 tons, worth

at present prices nearly $40,000,000." It is to be noted that this is more than three times the amount of potash now used annually in the United States. Mr. Milton Whitney, the chief of the Bureau of Soils, adds: "Moreover, it should be perfectly feasible to cover most, if not the entire, cost of production of this vast 'crop' by the iodine and other by-products produced simultaneously." Dr. Frank K. Cameron, under whose special direction the work has been carried on, sums up the potash situation in the United States as follows:

"In so far as present information goes, the Pacific kelp groves are and probably will remain by far the most important American source of potash. In fact, if carefully and skillfully husbanded they promise to approximate and perhaps even surpass, in importance and value, the famous Stassfurt mines. Alunite, important as it is, falls far behind."

The great kelps of the three genera chiefly considered live attached to the bottom in water that is mostly from 10 to 100 feet in average depth, whence they grow to the surface, forming extensive beds or groves. Detailed methods of cutting or harvesting in a practical and economic way have not yet been fully worked out, but it is believed that the problem offers no insuperable difficulties. *Nereocystis* and *Pelagophycus*, though sometimes growing to a length of from 60 to 150 feet, are annuals, while *Macrocystis* is apparently a perennial plant, and these facts will have to be considered in devising practical methods of harvesting and conserving the kelp groves. Professor George B. Rigg (Appendix L, Ecological and economic notes on Puget Sound kelps, pp. 179–193) finds that in Puget Sound the spores of *Nereocystis* are for the most part ripened and set free by July 15 and that after that date it would be possible to harvest this kelp without interfering with the next season's crop.

Besides the special papers already mentioned, Senate Document No. 190 includes a botanically important and useful paper on "The kelps of the United States and Alaska" (Appendix K, pp. 130–178) by Professor William Albert Setchell, embracing a general morphological and ecological account of the Laminariaceae, keys to the genera and species of both the Atlantic and Pacific coasts, and an interesting résumé of the past and present

economic uses of the kelps. Other papers are "The kelps of the central Californian coast" (Appendix M, pp. 194–208) by Professor Frank M. McFarland; "The kelps of the southern Californian coast" (Appendix N, pp. 209–213) by Captain W. C. Crandall; "Brief notes on the kelps of Alaska" (Appendix O, pp. 214–216), by Edward C. Johnston; "The technology of the seaweed industry" (Appendix Q, pp. 232–262), by Dr. J. W. Turrentine; "A discussion of the probable food value of the marine algae" (Appendix R, pp. 263–270), by Dr. C. L. Alsberg; and two bibliographical lists of anonymous authorship. Eleven of the nineteen plates attached to this Senate Document show habit photographs of various Pacific coast kelps; two photographs of *Nereocystis*, *in situ*, are especially striking. The nineteen maps show the position and extent of the kelp beds of the Puget Sound region and of the southern half of the coast of California. Some of the kelp beds, especially those of the perennial *Macrocystis*, are so dense as to afford some protection for certain harbors, acting as natural breakwaters, and it has been objected that the cutting away of these masses of kelp might endanger the safety of such harbors. To this objection the reply is made that the harbor of Santa Barbara, California, is probably the only one that might suffer in this way, and that any such undesirable effects of harvesting the kelps for their potash could probably be obviated by attention to the time and manner of cutting. It is of interest to observe, as already announced in the news columns of *Science* and of Torreya, that during the present summer the Bureau of Soils is extending its detailed surveys of the Pacific kelp groves to Alaska.

Marshall A. Howe

The Torrey Botanical Club

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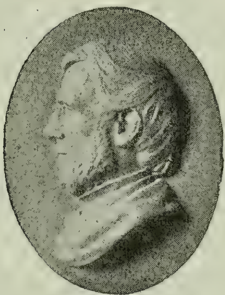
EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR



JOHN TORREY, 1796–1873

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SOME LOCAL NAMES OF PLANTS

By W. L. McAtee

The following collection of local plant names consists chiefly of those learned during field work for the Biological Survey, U. S. Department of Agriculture. Most of them are not found in current glossaries, and the few that are, here receive new annotation. In American dictionaries of plant names, the citation of localities where each name is used is too often lacking. The locality is the very heart of the matter, is what gives the record interest and value for the study of lingual and racial peculiarities and history. It is essential, furthermore, for translation of these provincial terms into scientific nomenclature since the same name may have widely different meanings in different localities.

A large proportion of the names here listed are those of aquatic or marsh plants. Submerged aquatic plants in general are known among hunters and others as grass, moss or weeds. Various adjectival terms are used to specify the different kinds. The present list is indexed so that it may be used to supplement other glossaries.

Characeae

1. *Chara* sp.—Fine moss, New Richmond, Mich.; oyster grass, nigger-wool, Currituck Sound, N. C.; musk grass, St. Vincent Id., Fla.; skunk grass, Squibnocket, Marthas Vineyard, Mass. The last two names allude to a strong odor given off by a mass of the plants when freshly taken from the water. It is not a little suggestive of skunk.

Pinaceae

2. *Pinus serotina* Michx.—Rosemary pine, Santee Club, S. C.

[No. 9, Vol. 13, of Torreya, comprising pp. 199–223, was issued 2 September 1913]

JUNIPERACEAE

3. *Taxodium distichum* (L.) L. C. Rich.—Cypre, Avoyelles Parish, La.

TYPHACEAE

4. *Typha angustifolia* L.—Flag grass, Mississippi Delta, La.

SPARGANIACEAE

4*a*. *Sparganium* sp.—Ox-tongue, Santee Club, S. C. Sold to the Club as *Vallisneria spiralis*.

ZANNICHELLIACEAE

5. *Potamogeton nuttallii* Cham. and Schlecht.—Widgeon grass, Massachusetts.

6. *Potamogeton pectinatus* L.—Sago, Duluth, Minn.; eel grass, Lake Surprise, Texas, Centre Moriches, L. I., Currituck Sound, N. C.; Indian grass, Cayuga Lake, N. Y. (according to Dr. R. V. Pierce); foxtail or foxtail grass, Currituck Sound, N. C.; wild celery, Lake Surprise, Texas, Winnipeg, Manitoba. Apparently this is the plant known as "poker grass" in England, the name being taken from pochard, a duck closely related to our redhead.

7. *Potamogeton perfoliatus* L.—Duck grass, Centre Moriches, L. I.; redhead grass, Currituck Sound, N. C., St. Vincent Id., Fla.

8. *Potamogeton foliosus* Raf.—Grass moss, maiden-hair moss, Menasha, Ark.

9. *Ruppia maritima* L.—Nigger-wool, Chef Menteur, La.; widgeon grass, South Id., S. C.; puldoo grass, St. Vincent Id., Fla. The adjectival portion of this term is a modification of Poule d'eau, a name applied by the French citizens of the Southern States to the coot (*Fulica americana*).

NAIADACEAE

10. *Naias flexilis* (Willd.) Rostk. and Schmidt.—Fine or chaffy moss, Lake Wapanoca, Ark.

ALISMACEAE

11. *Echinodorus radicans* (Nutt.) Engelm.—Lily-pads, Lake Wapanoca, Ark.

12. *Sagittaria latifolia* Willd.—This is the famous wapato, wappatoo, or duck potato of the Northwestern States. It is known as Chinese onion, and muskrat potato at Oshkosh, Wis.
13. *Sagittaria platyphylla* (Engelm.) J. G. Smith.—Wild potato, Venice, La., Mississippi Delta, La.; white potato, Venice, La.; wild onion, Vermilion Bay, La.
14. *Sagittaria teres* S. Wats.—Goose grass, Currituck Sound, N. C.

ELEODACEAE

15. *Vallisneria spiralis* L.—Poppy, Cayuga Lake, N. Y. (according to Dr. R. V. Pierce); ox-tongue, Chef Menteur, La.

POACEAE

16. *Echinochloa crus-galli* (L.) Beauv. [including the forms *longearistata* Nash and *walteri* Pursh.].—Wild rice, Cameron, La., Avoyelles Parish, La., in fact this name is in use throughout lower Louisiana; blue duck food, Mississippi Delta, La.; wild millet, Oshkosh, Wis., Gaston, Ore.; goose grass, Grand Island, Illinois River.
17. *Panicum condensum* Nash.—Folle avoine, Hamburg, La. This name may be applied by our French-speaking people to almost any grass with a conspicuous panicle. The most talked of, yes even traditional folle avoine is either *Zizania* or *Zizaniopsis.*
18. *Panicum repens* L.—Johnson grass, Mississippi Delta, La., Belle Isle, La.
19. *Zizaniopsis miliacea* (Michx.) Doell. and Aschers.—Cut grass, Mississippi Delta, La.; white marsh, Santee Club, S. C.; roseau, Hamburg, La.
20. *Zizania aquatica* L.—Wild oats, Kittyhawk, N. C.; wild millet, Apalachicola, Fla.*
21. *Spartina glabra* Muhl.—Wild rice, Cameron, La.; oyster grass, Mississippi Delta, La.
22. *Phragmites communis* Trin.—Cane, St. Vincent Id., Fla.,

* For a long list of popular synonyms of *Zizania*, see Jenks, A. E., 19th Ann. Rep. Bur. Am. Ethnol. (1897–98), 1900, pp. 1022–1024.

Mississippi Delta, La., Vermilion Bay, La.; roseau, Chef Menteur, La., Mississippi Delta, La.; in fact this term is in use in most parts of Louisiana. In France this species is the roseau a bàlai (broom reed), while *Arundo donax* is the roseau commun.

23. *Distichlis spicata* (L.) Greene.—Wire grass, Santee Club, S. C.
24. *Arundinaria tecta* (Walt.) Muhl.—Cane, Church's Island, N. C., Santee Club, S. C.; switch cane, Lake Charles, La.

Cyperaceae

25. *Cyperus engelmannii* Steud. and *Cyperus speciosus* Vahl.—Red-top grass, Lake Wapanoca, Ark.
26. *Cyperus pseudovegetus* Steud.—Cache-cache, Lake Pearl, La. All species of the genus *Cyperus*, as well as similar appearing plants of other genera, go by this name throughout most of Louisiana.
27. *Scirpus americanus* Pers.—Three-square, Squibnocket, Marthas Vineyard, Mass., Centre Moriches, L. I.
28. *Scirpus eriophorum* Michx.—Bull-head, Santee Club, S. C.
29. *Scirpus occidentalis* (Wats.) Chase.—Cane, Marquette, Wis.
30. *Scirpus robustus* Pursh.—Goose grass (the rootstocks being eaten), Mississippi Delta, La.
31. *Scirpus* spp.—Coco, coco grass, sometimes sweet coco grass, various localities in Louisiana.
32. *Rhynchospora corniculata* (Lam.) A. Gray.—Pollywog, Santee Club, S. C. An apt term taken from the beaked akenes.

Araceae

33. *Peltandra virginica* (L.) Kunth.—Hog wampee, Santee Club, S. C. Hogs are very fond of the roots and leaves of this plant. Arrow-weed, New Richmond, Mich.

Lemnaceae

34. *Lemna. Wolffia.*—These plants, together with *Azolla* and *Ricciella*, collectively are termed "seed moss" at Menasha Ark.

Pontederiaceae

36. *Piaropus crassipes* (Mart.) Britton.—Waterlilies, Marksville, La.

37. *Pontederia cordata* L.—Black potato, Venice, La.; cow, cooter or dog-tongue wampee, Santee Club, S. C. Called cooter wampee because cooters or fresh-water terrapins eat the leaves. It is said that hogs avoid this plant. Gerard* also notes the use of this name in South Carolina and states that it is sometimes applied to *Arisaema triphyllum* in addition to *Pontederia* and *Peltandra*. It is of interest that the term wampee is employed in China to distinguish a plant of the citrus family (*Cookia punctata*†).

Smilacaceae

38. *Smilax* spp.—Called by the very appropriate name hell-ropes in Arkansas. Devil's clothes-line is the apt vernacular in parts of Maryland.

Saururaceae

39. *Saururus cernuus* L.—Swamp lily, Big Lake, Ark.

Fagaceae

40. *Quercus laurifolia* Michx.—Red, pin or water oak, Abbeville, La.

41. *Quercus lyrata* Walt.—Spanish oak, Big Lake, Ark.

42. *Quercus michauxii* Nutt.—White oak, Abbeville, La.

43. *Quercus nigra* L.—Bastard oak, Santee Club, S. C.

44. *Quercus texana* Buckl.—Willow oak, Abbeville, La.

Ulmaceae

45. *Planera aquatica* (Walt.) J. F. Gmel.—Chataignier, Marksville, La. Quite a new application of this French name for *Castanea vesca*.

46. *Celtis mississippiensis* Bosc.—Hen-turd tree, Church's Island, N. C.

* Garden and Forest, IX, No. 439, July 29, 1896, p. 303.

† Smith, J. Dictionary of Economic Plants, 1882, p. 434.

POLYGONACEAE

47. *Polygonum hydropiper* L.—Wild buckwheat, Gaston, Ore.
48. *Polygonum lapathifolium* L.—Horse marsh, Santee Club, S. C.
49. *Polygonum sagittatum* L.—Cut or saw grass, Santee Club, S. C.

CHENOPODIACEAE

50. *Salicornia ambigua* Michx.—Cactus, Cameron, La.

PHYTOLACCACEAE

51. *Phytolacca decandra* L.—Chou gras (fat cabbage), Marksville, La.

NELUMBONACEAE

52. *Nelumbo lutea* (Willd.) Pers.—Vole, Lake Pearl, Marksville, and other localities in Louisiana. Grand ovale, yawk nut, Venice, La.; yonkapin, Big Lake, Ark. Gerard* gives a similar term wampapin, as probably from an Algonkin dialect.

NYMPHAEACEAE

53. *Castalia* sp.—Alligator blankets, Santee Club, S. C.

CERATOPHYLLACEAE

54. *Ceratophyllum demersum* L.—Coon-tail, Big Lake, Ark., Marksville, La.; coon-tail moss, Menasha and Lake Wapanoca, Ark.; June grass, Centre Moriches, L. I.

MAGNOLIACEAE

55. *Magnolia foetida* (L.) Sarg.—Bay, Longbridge, La.

BRASSICACEAE

56. *Erysimum inconspicuum* (Wats.) MacM.—Jim Hill mustard, Missoula Mont. (according to Prof. D. E. Lantz, Aug. 23, 1912). This term insinuates that the Northern Pacific Railroad is responsible for the dissemination of this weed.

* Garden and Forest, IX, No. 439, July 29, 1896, p. 303.

SARRACENIACEAE

57. *Sarracenia minor* Walt.—Fly-traps, Santee Club, S. C.

ALTINGIACEAE

58. *Liquidambar styraciflua* L.—Copal, Marksville, La.

PLATANACEAE

59. *Platanus occidentalis* L.—Cotonnier, Avoyelles Parish, La. The suggestion of cotton about sycamore seems too slight to warrant the use of this name.

MIMOSACEAE

60. *Vachellia farnesiana* (L.) Wright and Arn.—Mesquite, Cameron, La.

CASSIACEAE

61. *Cassia occidentalis* L.—Coffee-weed, Cameron, La.
62. *Cassia tora* L.—Café sauvage, Marksville, La.
63. *Gleditsia triacanthos* L.—Garofier, Marksville, La.

FABACEAE

64. *Lupinus diffusus* Nutt.—Lavender, St. Vincent Id., Fla.
65. *Sesban macrocarpa* Muhl.—Café sauvage (wild coffee), Indigo sauvage, Marksville, La.; coffee-weed, St. Vincent Id., Fla.
66. *Daubentonia longifolia* (Cav.) D. C.—Coffee-weed, Cameron, La.
67. *Aeschynomene virginica* (L.) B. S. P.—Coffee-grass, Santee Club, S. C.
68. *Erythrina herbacea* L.—Coral vine, St. Vincent Id., Fla.
69. *Canavalia obtusifolia* (Lam.) D. C.—Sea bean, St. Vincent Id., Fla.

RUTACEAE

70. *Fagara clava-herculis* (L.) Small.—Pillenterry, Church's Id., N. C.

EUPHORBIACEAE

71. *Croton engelmannii* Ferguson.—Goat-weed, sheep-weed, Marksville, La.

72. *Croton punctatus* Jacq.—Dove-weed, St. Vincent Id., Fla. Doves (*Zenaidura macroura*) are fond of the seeds.

ANACARDIACEAE

73. *Rhus canadensis* Marsh.—Polecat berries, Cedar Gap, Ozark Mts., Mo. (O. E. Lansing).

AQUIFOLIACEAE

74. *Ilex cassine* L.—Henderson wood, Okefenoke Swamp Charlton Co., Ga. (Huron H. Smith; this name and the last are from sheets in Field Museum).

75. *Ilex glabra* (L.) A. Gray.—Gall berry, Santee Club, S. C., St. Vincent Id., Fla.; gall ring berry, St. Vincent Id., Fla. The writer is satisfied that these names are applied to *Ilex glabra*, although in both localities the plant pointed out was the rather similar appearing *Gaylussacia frondosa.*

76. *Ilex vomitoria* Ait.—Youpon, Church's Island, N. C.; cassena, Santee Club, S. C.; red haw or hoy, Chef Menteur, La.

ACERACEAE

77. *Acer drummondii* Hook and Arn.—White maple, Lake Pearl, La.; plane, Avoyelles Parish, La.

RHAMNACEAE

78. *Berchemia scandens* (Hill) Trelease.—Black-jack, rattan vine, Abbeville, La.; coon grapes, Marksville, La.

MALVACEAE

79. *Sida spinosa* L.—Nail grass, Marksville, La.

80. *Hibiscus lasiocarpus* Cav.—Wild cotton, Marksville, La.

TAMARICACEAE

81. *Tamarix gallica* L.—Salt-water cedar, Belle Isle, La.

PASSIFLORACEAE

82. *Passiflora incarnata* L.—Pop-apple, Church's Island, N. C.

OPUNTIACEAE

83. *Opuntia* sp.—Pomme a raquet, Marksville, La.

LAURACEAE

84. *Persea pubescens* (Pursh.) Sarg.—Sweetberry tree, Santee Club, S. C.

LYTHRACEAE

85. *Decodon verticillata* (L.) Ell.—Red-root, New Richmond, Mich.

ONAGRACEAE

85*a*. *Jussiaea diffusa*.—Water pusley, Big Lake, Ark.

GUNNERACEAE

86. *Myriophyllum pinnatum* (Walt.) B. S. P.—Foxtail moss, Big Lake, Ark.

CORNACEAE

87. *Cornus florida* L.—Ironwood, Lake Pearl, La.

EBENACEAE

88. *Diospyros virginiana* L.—Placnier, Avoyelles Parish, La.

SAPOTACEAE

89. *Bumelia lanuginosa* (Michx.) Pers.—Slow-wood, slow-bush, black haw, Cameron, La.

STYRACACEAE

90. *Styrax americana* Lam.—Chaparrelle, Marksville, La.

OLEACEAE

91. *Adelia acuminata* Michx.—Bois blanc, Marksville, La.
92. *Adelia porulosa* Poir.—Crow-berry, Osprey, Fla. (J. T. Rothrock).
93. *Osmanthus americanus* (L.) B. and H.—Black haw, St. Vincent Id., Fla.

CONVOLVULACEAE

94. *Ipomoea pes-caprae* (L.) Sweet.—Railroad vine, St. Vincent Id., Fla.

SOLANACEAE

95. *Physalis angulata* L.—Bonnets de Grandmamam, Marksville, La.

96. *Capsicum baccatum* L.—Bird peppers, Cameron, La.
97. *Lycium carolianum* Walt.—Wild gooseberry, Cameron, La.

VERBENACEAE

98. *Callicarpa americana* L.—Commode mulberry, Santee Club, S. C.

PINGUICULACEAE

99. *Utricularia* sp.—String moss, Menasha, Ark.

LORANTHACEAE

100. *Phoradendron flavescens* (Pursh.) Nutt.—Boule de gu, Marksville, La.

RUBIACEAE

101. *Cephalanthus occidentalis* L.—Elbow brush, New Richmond, Mich.; Bois de marais, Marksville, La.

AMBROSIACEAE

102. *Iva frutescens* L.—Lavender, Santee Club, S. C.; horse brush, St. Vincent Id., Fla.; mangrove, Cameron, La.; mangrove brush, Vermilion Bay, La.; mongo tree, Chef Menteur, La.

CARDUACEAE

103. *Baccharis halimifolia* L.—Lavender, Santee Club, S. C.
104. *Pluchea camphorata* (L.) D. C.—Pink-top smartweed, Church's Island, N. C.
105. *Borrichia frutescens* (L.) D. C.—Button lavender, Santee Club, S. C., Cameron La.
106. *Helenium tenuifolium* Nutt.—Bitter weed, Cameron, La.

INDEX

SOME INTRODUCED PLANTS OF SALT LAKE COUNTY, UTAH

By A. O. Garrett

The following is a fairly representative list of the introduced plants, and incidentally of the introduced weeds, of Salt Lake County. In consideration of the fact that these introduced weeds are by far the most troublesome, it is a pity that their spread was ever permitted. When we realize the immense damage done to agriculture through the agency of weeds, we are surprised that more states do not have regular state "weed inspectors," whose duty shall be the extermination of weeds in general, but especially the watching out for, and the prompt extirpation of, those plants introduced from time to time that are likely to become pests. The writer has observed, in the course of the past ten years, several plants spread themselves throughout Salt Lake City; plants that when he came to Salt Lake City in the autumn of 1902 were either very rare or else were apparently not here at all. A very little directed effort would have saved the day.

Bromus tectorum. Downy Brome Grass. In alfalfa fields and covering the hillsides. Alfalfa hay containing much of this grass fails to command the price of grass-free alfalfa, thereby resulting in an annual depreciation of many thousands of dollars.

Bromus sterilis. Sterile Brome Grass. Associated with *Bromus tectorum.* Equally objectionable.

Bromus hordeaceus. Soft Chess. Abundant on the benches about Salt Lake City.

Rumex crispus. Curled Dock. Abundant along the irrigation ditches.

Rumex Acetosella. Field Sorrel. Occurring occasionally in lawns and waste places. As yet rare.

Polygonum aviculare. Door-weed. Abundant in waste places in city lots.

Chenopodium album. Lamb's-quarters. Abundant in waste places.

Salsola Kali tenuifolia. Russian Thistle. Abundant in salty soil, and becoming equally abundant along the roadsides and in waste places.

Amaranthus retroflexus. Green Amaranth. Common in cultivated fields.

Saponaria Vaccaria. Corn Cockle. Not uncommon in fields and waste places.

Cerastium brachypodum. Mouse-ear Chickweed. Occasionally occurring in lawns.

Portulaca oleracea. Purslane. Found occasionally in cultivated fields.

Ranunculus arvensis. Field Crowfoot. Found in one of the canyons by the writer, where it is apparently well established.

Fumaria officinalis. Fumitory. Well established along railroad tracks and adjacent roads in some places.

Brassica nigra. Black Mustard. Abundant along roadsides and in waste places.

Brassica Rapa. Turnip. Not uncommon along roadsides.

Lepidium Draba. Hoary Cress. Scarcely known ten years ago, but now becoming abundant.

Lepidium perfoliatum. Also becoming abundant. The writer observed this species for the first time about five years ago. So far as I know, this species has not been reported as occurring elsewhere in the United States.

Conringia orientalis. Hare's-ear Mustard. Occurring occasionally in waste places in the towns.

Sisymbrium officinale. Hedge Mustard. Common in neglected yards.

Sisymbrium altissimum. Tumbling Mustard. Another weed, now everywhere, that was unknown ten years ago. On account of its tumbling habit, it spreads very rapidly, and is likely to become as great a nuisance as the Russian Thistle.

Sophia Sophia. Herb-Sophia. Abundant in West Salt Lake in waste grounds.

Capsella Bursa-pastoris. Shepherd's Purse. This cosmopolitan weed is abundant everywhere.

Alyssum alyssoides. Yellow Alyssum. Common on the dry hillsides and occasionally found in waste places in Salt Lake City.

Camelina sativa. False Flax. Abundant in waste places.

Radicula Nasturtium-Aquaticum. Water Cress. Introduced in the springs between Provo and Springville in 1852, and now abundant throughout the state.

Erysimum repandum. Treacle Mustard. Abundant in waste places in Salt Lake City.

Melilotus alba. White Sweet Clover. Abundant, especially along irrigation ditches.

Melilotus officinalis. Yellow Sweet Clover. Very seldom seen.

Trifolium repens. Dutch Clover. Abundant; even found in the canyons to altitudes of nine thousand feet.

Trifolium hybridum. Alsike Clover. In waste places in Salt Lake City, and along irrigation streams.

Trifolium pratense. Red Clover. Occasionally an escape.

Geranium pusillum. Occasionally occurring in grassy places.

Euphorbia dentata. Not uncommon in waste places in the south-eastern part of Salt Lake City.

Malva rotundifolia. Cheeses. Abundant everywhere in waste places.

Pastinaca sativa. Parsnip. Not uncommon along irrigation ditches.

Conium maculatum. Poison Hemlock. Abundant along irrigation ditches.

Convolvulus sepium. Hedge Bindweed. In waste places; not very common.

Convolvulus arvensis. Field Bindweed. Abundant in fields and waste grounds.

Asperugo procumbens. Madwort. Occasionally found in alfalfa fields and in waste places.

Lithospermum arvense. Corn Gromwell. Common in waste places.

Amsinckia tesselata. In waste places and about rubbish piles.

Amsinckia intermedia. Same as preceding species.

Mentha spicata. Spearmint. Abundant in the irrigation ditches throughout the state.

Nepeta Cataria. Catnip. Not uncommon in waste places.

Marrubium vulgare. Horehound. Abundant in waste ground throughout the state.

Leonurus Cardiaca. Motherwort. Occasionally found near streams.

Lamium amplexicaule. Henbit. Occasionally found in waste places.

Lamium purpureum. Same as above.

Solanum nigrum. Common Nightshade. Occasionally occurring in lawns and waste places.

Datura Tatula. Purple Jimsonweed. Occasionally found on waste grounds.

Verbascum Thapsus. Common Mullein. Occurring at the mouths of the canyons.

Veronica arvensis. Corn Speedwell. Occasionally found on lawns.

Veronica agrestis. Field Speedwell. Same as preceding species.

Plantago lanceolata. English Plantain. Not uncommon on lawns.

Plantago major. Common on lawns and along irrigation ditches.

Rubia tinctoria. Madder. Well established along irrigation ditches in Sale Lake and Davis counties, but not yet common.

Leptilon canadense. Horse-weed. Occasionally occurring in waste places, but not yet common.

Chrysanthemum Leucanthemum. Ox-eye Daisy. Has very recently been introduced through the agency of impure grass seed.

Cirsium lanceolatum. Common Thistle. Abundant along irrigation ditches.

Cirsium arvense. Canada Thistle. Abundant in some places, but not generally distributed.

Cichorium Intybus. Chicory. Well established in Salt Lake County for many years, but apparently not spreading rapidly.

Tragopogon porrifolius. Salsify. Not uncommon in moist meadows, and apparently spreading rapidly.

Lactuca Scariola. Prickly Lettuce. Abundant in waste places.

Taraxacum officinale. Dandelion. Most abundant; in lawns and pastures.

Arctium minus. Burdock. Very common along irrigation ditches.

Centaurea solstitialis. Star Thistle. Occasionally found in West Salt Lake.

Matricaria suavolens. Pineapple Weed. Abundant in waste places.

High School,
Salt Lake City, Utah

FIVE HUNDRED MILES THROUGH THE APPALACHIAN VALLEY

By Roland M. Harper

The shortest railroad route between Washington and New Orleans, namely, via Lynchburg, Bristol and Chattanooga, 1,118 miles, passes for just about half this distance through the Appalachian Valley, which lies at the northwestern base of the Blue Ridge. The route crosses the Blue Ridge and enters the valley (there known as the Shenandoah Valley) a few miles east of Roanoke, Virginia, and passes out of it into the coastal plain at its extreme southwestern end, near Woodstock, Alabama.

The Appalachian Valley is underlaid by much folded and faulted Paleozoic strata, mostly Cambrian, Ordovician and Silurian, varying lithologically from limestone and dolomite to shale and sandstone, and giving rise to a great variety of soils, among which reddish and yellowish clayey loams seem to predominate. It averages about fifty miles wide, and contains many longitudinal ridges, some of these rising to about 2,500 feet above sea-level, but never exceeding in height the mountains bordering the valley. The highest elevations are in Virginia, but the ridges seem to stand out more conspicuously in Alabama, where the intervening valleys are lower. Between Pulaski and Wytheville, Va., at an elevation of about 2,000 feet, the railroad crosses a region of Lower Carboniferous sandstone, with topography and vegetation strongly resembling that of the Cumberland Plateau to the westward; but elsewhere the scenery is

characteristically valley-like, and the topography merely undulating or hilly. (The railroad goes through two tunnels in Montgomery County, Virginia, one in Pulaski County, and one in Hamilton County, Tennessee.)

Rock outcrops are very irregularly distributed along the route, being abundant in some parts and practically wanting in others. In some places, where limestone predominates, the drainage is largely subterranean, and lime-sinks are frequent; but generally there are streams of various sizes in sight. The more level areas are mostly cultivated or pastured, and the hilly and rocky places pastured or wooded. Pastures are more prevalent northward, here as in several other regions.

At daybreak on April 23, 1912, I was just passing Roanoke, Va., going southwestward, and by nightfall, 13½ hours later, I had reached Chattanooga, Tenn., 392 miles away. I remained on the same train as far as Fort Payne, Ala., passing through the northwesternmost county of Georgia for about 25 miles after dark; and the next day I continued my journey by daylight to the southwestern end of the valley and beyond. (The Alabama end of it has recently been described in my geographical report on the economic botany of Alabama.*)

In traveling lengthwise of the valley one does not cross any natural boundaries that have much geographical significance, but in order to bring out some differences in plant distribution due to latitude, etc., the route will be divided arbitrarily into four approximately equal parts.

In the following table the plants identified from the train two or more times between Roanoke and Woodstock are divided into trees, shrubs and herbs, and four numbers are prefixed to each species. The first denotes the number of times the plant was seen between Roanoke and Bristol, 150 miles, the second is for Bristol to Knoxville, 131 miles, the third for Knoxville to Chattanooga, 111 miles, and the fourth for Fort Payne to Woodstock, 120 miles.

For those who may wish to correlate distribution with political boundaries it will be convenient to remember that the first

* Geol. Surv. Ala., Monog. 8: 58–63. June, 1913.

column of numbers pertains entirely to Virginia, the second and third to Tennessee, and the fourth to Alabama.

Species seen only once in 500 miles are not listed, because they are believed to have very little geographical significance. The names of evergreens are printed in bold-face type.

Trees

20—33—22—20	*Cornus florida*	5— 0— 0— 0	**Pinus rigida?**
31—37—12—11	**Juniperus Virginiana**	4— 1— 0— 0	*Ulmus fulva*
0—20—28—25	**Pinus echinata**	1— 1— 0— 2	*Hicoria alba*
31—25— 3— 0	*Cercis Canadensis*	3— 1— 0— 0	*Quercus coccinea?*
15—12— 7— 4	**Pinus Virginiana**	0— 3— 1— 0	*Acer saccharinum*
0— 0— 7—31	**Pinus Taeda**	0— 0— 0— 4	*Quercus stellata*
7— 1— 7—18	*Salix nigra*	0— 0— 0— 4	*Malus angustifolia*
0— 1— 6—25	*Liquidambar Styraciflua*	0— 0— 0— 4	*Celtis* sp.
9— 7— 5— 5	*Liriodendron Tulipifera*	0— 0— 0— 4	*Hicoria ovata*
16— 1— 4— 4	*Platanus occidentalis*	2— 0— 0— 1	*Acer Negundo*
9— 5— 1— 8	*Quercus alba*	2— 0— 0— 1	*Fagus grandifolia*
0— 0— 1—15	*Quercus Phellos*	3— 0— 0— 0	*Acer Saccharum?*
10— 4— 0— 0	**Pinus Strobus**	0— 0— 0— 3	*Quercus nigra*
4— 1— 5— 2	*Acer rubrum*	0— 0— 0— 3	**Pinus palustris**
4— 4— 1— 0	*Aesculus octandra*	2— 0— 0— 0	**Thuya occidentalis**
0— 0— 0— 9	*Quercus Marylandica*	0— 0— 2— 0	*Ulmus Americana?*
8— 0— 0— 0	*Robinia Pseudacacia*	0— 0— 2— 0	*Diospyros Virginiana*
3— 2— 0— 1	*Juglans nigra*	0— 0— 0— 2	*Quercus falcata*
5— 1— 0— 0	*Prunus Americana?*	0— 0— 0— 2	*Fraxinus Americana?*
5— 1— 0— 0	**Tsuga Canadensis**	0— 0— 0— 2	*Quercus pagodaefolia?*
1— 3— 1— 0	*Castanea dentata*		

Shrubs and Vines

3—10— 8— 2	**Lonicera Japonica**	0— 0— 0— 5	*Aesculus Pavia*
3— 3— 5— 7	*Sassafras variifolium*	0— 0— 5— 0	*Azalea nudiflora*
3— 3— 5— 0	*Rhus glabra*	3— 0— 0— 2	*Alnus rugosa*
0— 1— 3— 4	*Prunus angustifolia*	2— 0— 0— 0	*Salix discolor?*
2— 0— 1— 4	*Sambucus Canadensis*	2— 0— 0— 0	*Rhododendron maximum*
0— 2— 3— 1	*Rhus radicans*		

Herbs

19— 9— 1— 0	*Fragaria Virginica*	4— 0— 0— 0	*Spathyema foetida*
7—11— 2— 6	*Podophyllum peltatum*	1— 1— 2— 0	*Juncus effusus*
7— 9— 0— 0	*Taraxacum*	3— 0— 0— 0	*Geranium maculatum*
0— 0— 0—10	*Senecio lobatus*	3— 0— 0— 0	*Aquilegia Canadensis*
4— 5— 1— 0	*Verbascum Thapsus*	3— 0— 0— 0	*Caltha palustris*
0— 4— 3— 3	*Andropogon scoparius*	0— 0— 0— 3	*Ranunculus* sp.
2— 1— 0— 3	*Typha latifolia*	2— 0— 0— 0	*Daucus Carota*
0— 0— 0— 5	*Salvia lyrata*	1— 1— 0— 0	*Arctium* sp.
3— 1— 0— 0	*Brassica* sp.	0— 0— 1— 1	*Pteridium aquilinum*
3— 0— 1— 0	*Verbesina occidentalis*	0— 0— 0— 2	*Rumex crispus*

If the figures for each species in each division of the foregoing list are added together they will form approximately a geometrical progression. Whether there is any explanation for it or not, this seems to be a fundamental property of quantitative analyses of vegetation, as it is of many other kinds of statistics (*e. g.*, the populations of the cities of the United States, arranged in order of size.)

If the trip had been made a few weeks earlier or later *Cornus florida* and *Cercis Canadensis* would have stood considerably lower in the list of trees, because at this time they were in bloom, and therefore very conspicuous. (The fact that *Cercis* was seen 56 times north of Knoxville and only three times south of there indicates that its flowering season was just about at an end in that latitude.) The numbers for most of the oaks would have been higher in summer, for it was difficult to identify them with their leaves only partly developed.

If we add together all the figures for evergreen trees (nine species, all conifers) we find that they make up 39.2 per cent. of the total number of trees; and this estimate is probably not affected much by the season at which the observations were made. Doing the same thing for each column of figures separately, we get 34 per cent. of evergreens for the Virginia portion of the route, 45.1 per cent. for Bristol to Knoxville, 47 per cent. for Knoxville to Chattanooga, and 35.2 per cent. for the Alabama portion. (My estimate for the whole Coosa valley region of Alabama, in the publication above referred to, is 40 per cent.) Just why the percentage of evergreens should be so much higher in the valley of East Tennessee than in the corresponding parts of Virginia and Alabama is not at present obvious. The discrepancy can hardly be due to errors of observation, for the work was done under the same conditions all the way; and it is probably not correlated with any phaenological or climatic factors, because the Tennessee figures do not lie between those for Virginia and Alabama. The fundamental cause is probably in the soil.

The distribution of the following species is of more than passing interest.

Pinus Taeda was first seen a little north of Cleveland, Tenn.,

and the first cotton field was seen a few minutes later. The correlation between the distribution of these two things is remarkably close in some places.

Pinus echinata was first seen about ten miles southwest of Bristol, in Tennessee, but did not become abundant until about fifty miles farther on. It would appear from the map in Mohr's "Timber pines of the southern United States" (U. S. Forestry Bulletin 13) that it extends much farther north in the mountains to the westward than in the Appalachian Valley.

Pinus Strobus, occasional in Virginia, was last seen about 45 miles southwest of Bristol. It barely overlaps *P. echinata*, and on this route does not grow anywhere near *P. Taeda*. One might suppose from the gap between their ranges that there is a climatic barrier between *P. Strobus* and *P. Taeda*, but I have seen them growing side by side at the western base of the Cohutta Mountains in Murray County, Georgia.

Tsuga Canadensis has a distribution and habitat much like that of *Pinus Strobus*, but on this route it was seen only about half as often. Sometimes it was accompanied by *Rhododendron maximum*, especially in the sandstone country near Pulaski, Va.

Thuya occidentalis was seen twice on rocky bluffs in Smyth County, Virginia.

Spathyema foetida was seen a few times in Wythe and Washington Counties, Virginia, and *Caltha palustris* in Wythe and Smyth. I do not remember ever seeing either farther south, although they are supposed to grow in the mountains of North Carolina.

Fagus grandifolia was seen only a few times, and *Betula nigra* not at all.

Phoradendron flavescens was noted only once, that in Greene County, Tennessee.

Liquidambar is rare north of Knoxville, but very common in Alabama.

Fragaria was the commonest weed recognized along the right-of-way in Virginia, and *Lonicera Japonica* in Tennessee.

Acer saccharinum was observed only in Tennessee, along the Holston and Tennessee Rivers.

NEWS ITEMS.

The many friends of Edward Lyman Morris, the editor of the club, were shocked to hear of his sudden death on Sunday, 14 September. Mr. Morris was born at Monson, Mass., October 23, 1870, and was educated at Monson Academy, at Amherst College, and at the Harvard Graduate School. He was laboratory assistant and instructor in botany at Amherst, 1893–95; instructor in botany at Western High School, Washington, 1895–1896, and later became head of the department of biology in the Washington High Schools. He was also special plant expert of the United States National Herbarium and the United States Department of Agriculture, and field assistant of the United States Fish Commission. Besides the Torrey Club, Mr. Morris was a member of the Washington Biological Society, and of the Cosmos Club at Washington. At the time of his death he was curator of natural science at the Brooklyn Institute Museum, having been acting curator-in-chief, until January 1 last, since the resignation of Dr. F. A. Lucas in 1911. All editorial matters relating to the *Bulletin* will be attended to by Dr. M. A. Howe, New York Botanical Garden, until further notice.

Dr. Ralph Jones has resigned from the Bureau of Plant Industry, Fruit Disease Investigations, to accept the professorship in botany at Emory College, Oxford, Ga. The appointment became effective September 15.

We are glad to record the fact that W. Botting Hemsley, formerly keeper of the Kew herbarium and library, was recently made a Doctor of Laws by Aberdeen University.

Dr. G. H. Shull, of Cold Spring Harbor, has gone abroad for a year's study and travel, especially to write up the results of the past seven years' work. He will for some time be at Dr. Bauer's laboratory at Berlin.

At the Oregon Agricultural College, Dr. W. M. Atwood has been appointed instructor in botany; G. P. Posey, C. M. Scheerer and S. H. Corsant, teaching fellows, and S. R. Winston, formerly assistant in plant pathology at N. Car. Experiment Station, becomes plant pathologist at the Hood River Branch Experiment Station.

Mr. H. L. Rees formerly research assistant in plant pathology at the Oregon Agricultural College has resigned to take a similar position at the Western Washington Experiment Station. Mr. G. H. Godfrey fills the position vacated by Mr. Rees at the Oregon Experiment Station.

Dr. Henry Allan Gleason left on September 10 for a trip round the world. There will be a short stay in Japan, and about two months at Los Banos, Philippine Islands, as guests of Dr. Frank C. Gates, of the College of Agriculture. The time will be spent in exploration of the islands, botanically speaking. Thence the route lies either via Hong Kong, with side trip to Shanghai, or through Borneo to Singapore, including visits to the Botanical Gardens and the famous rubber plantations. From here he goes to Java to spend a couple of months at Buitenzorg. Returning to Singapore, Dr. Gleason expects to travel by coasting steamer via Penang and Rangoon to Calcutta, and overland via Madras to Ceylon, where the botanical gardens at Peradeniya will be studied for about two months more. From here he will probably come straight home, via Suez, Naples, and New York. Dr. Gleason will be back home by the middle of June, 1914. He is accompanied by Mr. Bert E. Quick.

Miss Mary W. Stewart has been appointed as assistant in botany at Barnard College.

Mr. C. A. McLendon, for the past five years botanist and plant-pathologist to the Georgia Experiment Station, in charge of plant-breeding investigations, has tendered his resignation to take effect October the first, after which date he expects to be engaged in private business.

Dr. Carl Correns, professor of botany at Munster, has been appointed director of the Research Institute for Biology of the Kaiser Wilhelm Society. Dr. Spemann, professor of zoölogy at Rostock, has been appointed assistant director.

Professor Moses Craig, formerly professor of botany at the Oregon Agricultural College and botanist of the station, later in charge of the herbarium of the Shaw Botanical Garden, St. Louis, died on August 31. He was graduated from the Ohio State University.

Ralph W. Curtis, B.S.A., who was for four years assistant superintendent of the Arnold Arboretum of Harvard University, has been appointed assistant professor of landscape art in the college of agriculture of Cornell University.

According to the *Evening Post* Carlton McDowell, Ph.D., has been appointed instructor in botany in the Sheffield Scientific School.

Dr. E. D. Clark, one of the board of editors of the club, has resigned his position at the Cornell Medical College to accept one at the Bureau of Chemistry at Washington.

On September 22 the offices, library and herbarium of the Brooklyn Botanic Garden were moved from the quarters occupied for the last three years in the Brooklyn Institute Museum building, to the first section of the new laboratory building, located in the garden. Only one fifth of the building is now completed, and a small portion of the conservatories. On September first the staff of the garden was increased by the addition of Dr. O. E. White, as assistant curator of plant breeding, Miss Ellen Eddy Shaw, as instructor, and Miss Helen Virginia Stelle, as librarian. During August the garden purchased the private herbarium of Mr. A. A. Heller, formerly of Reno, Nevada.

A. F. Blakeslee, who has been spending a year's leave of absence in research work in the Carnegie Station for Experimental Evolution at Cold Spring Harbor, L. I., has returned to the Connecticut Agricultural College, Storrs, Conn.

Miss Florence A. McCormick has been appointed adjunct professor of agricultural botany in the Univerisity of Nebraska.

The Torrey Botanical Club

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TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

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BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

CONTENTS

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TORREYA

November, 1913.

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THE FLORA OF THE SAND BARRENS OF SOUTHERN STATEN ISLAND

By Stewart H. Burnham

My first visit to this interesting region was on the 19th of September, 1901. The day was one of those perfect ones after a rain storm; and my companion Mr. J. C. Buchheister, familiar with this locality, was a most excellent guide, showing me where many rarities grew. To reach the barrens, one should start about 7 A.M., and after leaving the ferry at St. George, take the Staten Island Rapid Transit to Huguenot, where one leaves the train, walking westward along Huguenot Avenue to Rossville. The surface of the Island here, as elsewhere, is rolling, and from the hilltops fine views may be had of the Jersey shore and Orange mountains, across Staten Island Sound and the intervening salt marshes. Along this country road many plants grew, the large purple foxglove, *Agalinis purpurea* (L.) Britton, with its showy rose-colored flowers, was conspicuous in moist grassy places, not only here but also along the railroad from St. George. Over the shrubby growth of sassafras, dwarf sumac and small trees of sour gum and black cherry, the catbrier, *Smilax rotundifolia* L. clambers, guarding the trumpet honeysuckle, *Lonicera sempervirens* L., which was both in flower and fruit, against intruders. Other interesting plants occur, as *Panicum dichotomiflorum* Mx.; *Juncus acuminatus* Mx.; *Agrimonia parviflora* Soland.; *Apocynum sibiricum* Jacq.; *Phlox paniculata* L.; matrimony vine, *Lycium halimifolium* Mill., escaping from old gardens; *Koellia mutica* (Mx.) Britton easily recognized by its whitened upper leaves; and the rice-button and calico asters, *Aster dumosus* L. and *Aster lateriflorus* (L.) Britton.

Rossville with its quaint old Revolutionary hostelry, Sherman

[No. 10, Vol. 13, of Torreya, comprising pp. 225–248, was issued 14 October, 1913]

Inn, is surrounded on one side by extensive salt marshes, from which considerable hay was made from the marsh grasses, composed largely of the marsh spike-grass, *Distichlis spicata* (L.) Greene. Several plants were observed here, it being the only place where we attempted to go on the salt marshes. The sea lavender, *Limonium carolinianum* (Walt.) Britton casts a purplish glow over the marshes, broken here and there by patches of the sea-side goldenrod, *Solidago sempervirens* L. Several other coastal plants were found: *Cyperus filicinus* Vahl; *Cyperus speciosus* Vahl; *Scirpus robustus* L.; *Polygonum ramosissimum* Mx.; *Tissa marina* (L.) Britton; *Agalinis maritima* Raf.; *Plantago maritima* L.; *Aster subulatus* Mx.; *Aster tenuifolius* L. and marsh elder, *Iva frutescens* L. The swamp rose mallow, *Hibiscus moscheutos* L., occurs, but was not abundant enough to make the show that this plant usually does. About the edges of the marshes in the woodlands, one finds large tufts of several of the grasses, *Andropogon furcatus* Muhl., *Aristida purpurascens* Poir, *Panicum virgatum* L. and *Sorghastrum nutans* (L.) Nash. Here were rosy patches of the purple milkwort, *Polygala viridescens* L.; the clammy cuphea, *Parsonia petiolata* (L.) Rusby, which Mr. Buchhesiter said "discharged its seeds from the capsule before they were ripe"; *Koellia flexuosa* (Walt.) MacM.; *Bidens comosa* (Gray) Wieg. and the ox-eye, *Heliposis helianthoides* (L.) BSP.

Following the road again, about half the distance to Kreischerville, we find one of the most interesting spots in the New York state flora, the meeting of the northern and southern floras. The pine barrens of the Island are sandy wastes, covered with a growth of oaks; the black-jack oak, *Quercus marylandica* Muench.; post oak, *Quercus stellata* Wang., and the black oak, *Quercus velutina* L.; also I believe some of the hybrid oaks grow here. The pitch pine, *Pinus rigida* Mill., and mocker-nut, *Hicoria alba* (L.) Britton, occur in a dense undergrowth of peculiar and interesting plants. In many places one could gather quantities of salt-water clam shells in the sand, showing that at a comparatively recent period this portion of the Island was submerged.

On the barrens the glaucous-leaved catbrier, *Smilax glauca* Walt., clambers over the dwarf sumac, *Rhus copallina* L., the beach plum, *Prunus maritima* Wang., and the stagger-bush. The stagger-bush, *Neopteris mariana* (L.) Britton, is a handsome shrub with a reddish stem, coriaceous leaves and rather large snow-white flowers; although the flowering season was past, a few flowers remained. The bayberry family was represented by the very abundant sweet fern, *Comptonia peregrina* (L.) Coult., and the bayberry, *Myrica carolinensis* Mill. Many herbaceous plants cover the ground—*Cyperus Grayi* Torr.; *Stenophyllus capillaris* (L.) Britton; *Juncus scirpoides* Lam.; *Comandra umbellata* (L.) Nutt.; the pinkish white coast joint-weed, *Polygonella articulata* (L.) Meisn.; the large-flowered sensitive-pea, *Chamaecrista fasciculata* (Mx.) Greene; wild indigo, *Baptisia tinctoria* (L.) R. Br.; wild ipecac, *Tithymalopsis Ipecacuanhae* (L.) Small, a characteristic plant, the basal leaves forming rosettes in the clear sand and the foliage often tinged with purple; dense tufts of beach heather, *Hudsonia tomentosa* Nutt.; *Lechea Leggettii* Britton & Hollick; *Viola fimbriatula* J. E. Sm.; the prickly pear, *Opuntia opuntia* (L.) Coult.; *Asclepias amplexicaulis* J. E. Smith; the butterfly-weed, *Asclepias tuberosa* L.; the horse mint, *Monarda punctata* L.; buttonweed, *Diodia teres* L.; the "golden-eye," *Chrysopsis mariana* (L.) Nutt. with large yellow flowers; *Aster patens* Ait.; *Eupatorium rotundifolium* L.; *Solidago odora* Ait., the most abundant goldenrod; and gall-of-the-earth, *Nabalus serpentarius* (Pursh) Hook. One was obliged to pick his way carefully through this undergrowth and steer clear of the tick-trefoils, *Meibomia canadensis* (L.) Kuntze; *Meibomia marylandica* (L.) Kuntze; *Meibomia paniculata* (L.) Kuntze and *Meibomia rigida* (Ell.) Kuntze. A search was made for a small persimmon tree, *Diospyros virginiana* L., but it was not found; later in the day one was seen near Kreischerville, shedding its brownish leaves. Along a small stream flowing through the barrens, the narrow-leaved chain-fern, *Lorinseria areolata* (L.) Presl., grew in company with the common cinnamon fern. One might easily pass the chain-fern over, calling it the sensitive fern, if the fertile fronds were not seen.

A hog-nosed snake, brownish with a few markings and a broad flat head was seen; it lay very quiet and did not attempt to move away. Near the stream where the chain-fern grew, we stopped a few minutes for lunch; an old lady passed and went into the woods with her hand-saw, soon returning with a bundle of dry sticks. She looked quite quaint and old-fashioned, and asked us if the water was good.

Several of the clay beds, which have made this portion of the Island famous, were visited. The clay deposited here when the great Laurentian glacier moved down from the north is bluish in color and very fine-grained. The clay beds lie beneath the glacial till soil of the Island and often two or three different colored sands are found in the same pit, and curiously shaped red sandstone nodules. These valuable beds are said to have been first worked by Mr. Kreischer over 50 years ago, the industry of making brick, tile and stoneware giving employment to many of the inhabitants of this portion of the Island. One of the abandoned clay pits was an interesting club-moss locality; growing in a small area were plants of *Lycopodium adpressum* (Chapm.) Lloyd & Underw., *Lycopodium alopecuroides* L., *Lycopodium inundatum* L., and Mr. William H. McDonald's form of *Lycopodium adpressum*, which was described as forma *polyclavatum* McDonald in the Fern Bulletin 9: 8–9. Jan. 1899, the main distinction from the species being that the fruiting portion bears from 2–6 spikes. Clute's variety of the common braken, *pseudocaudatum*, "which differs from the species in its longer, narrower and more distinct pinnules" together with fine plants of the nodding ladies' tresses, *Ibidium cernuum* (L.) House; the orange-grass, *Sarothra gentianoides* L.; *Viola emarginata* (Nutt.) Le Conte; *Viola lanceolata* L.; *Viola primulifolia* L. and *Bartonia virginica* (L.) BSP. occur. Search was made for the savin-leaved club-moss, *Lycopodium sabinaefolium* Willd., which Mr. Buchheister said grew here, but a fire had probably destroyed it. Another abandoned clay pit yielded *Rynchospora glomerata* (L.) Vahl; the slender yellow-eyed grass, *Xyris flexuosa* Willd.; *Polygala Nuttallii* DC.; the hairy thoroughwort, *Eupatorium pubescens* Muhl. and the vervain thoroughwort, *Eupatorium verbenaefolium* Mx.

The woods about the pits were rather moist and largely composed of oak and maple with considerable underbrush. A few small trees of the Jersey pine, *Pinus virginiana* Mill., were found. Here were found the following plants: *Botrychium dissectum* Spreng.; *Panicum dichotomum* L.; *Panicum cladestinum* L.; *Panicum linearifolium* Scribn.; *Panicum sphaerocarpon* Ell.; the strawberry-bush, *Euonymus americanus* L.; *Viola Brittoniana* Pollard; the cowbane, *Oxypolis rigidius* (L.) Coult. & Rose; the sweet pepperbush, *Clethra alnifolia* L.; spotted prince's pine, *Chimaphila maculata* (L.) Pursh; the pinesap, *Hypopitys Hypopitys* (L.) Small; Indian pipe, *Monotropa uniflora* L.; *Cuscuta gronovii* Willd.; cowwheat, *Melampyrum lineare* Lam.; beechdrops, *Leptamnium virginianum* (L. Raf.), purple and yellowish plants, and *Ionactis linariifolius* (L.) Greene, the sandpaper starwort, with blue and white rays.

Continuing our journey along the road, we soon passed through Kreischerville, where by the roadside was found Dr. Torrey's old variety *obtusilobata* of the sensitive fern, the variety here arising by the cutting of the early sterile fronds by a scythe. We finally reached Tottenville, where we rambled over the beach, while waiting for a late train to bear us back to the heart of the metropolis. The plants noted here were the rockweed, *Fucus vesiculosus* L., and sea lettuce, *Ulva latissima* Lam., and the sea-beach orache, *Atriplex arenaria* Nutt. A small cultivated tree of paper mulberry, *Papyrius papyrifera* (L.) Ktze., was found. The result of this trip was a large vasculum and portfolio crammed full of plants, representatives of about 120 species, 33 of which I had never seen growing in their native habitats.

My second visit was on as auspicious a day as the first, the 29th of May, 1902. I went over practically the same ground as on the previous trip; although the spring flora was not as interesting, yet I felt repaid for the effort. The red cedars along Huguenot Avenue had suffered quite severely from the ice-storm of the preceding winter. The Carolina dwarf dandelion, *Krigia virginica* (L.) Willd., was the most conspicuous flower in bloom, abundant everywhere and appearing as a weed in meadows. The trumpet honeysuckle was in full bloom; and flowering and

fruiting plants of the sweet vernal grass, *Anthoxanthum odoratum* L.; *Carex complanata* Torr. and *Carex squarrosa* L. On the salt marshes at Rossville were found black-grass, *Juncus Gerardi* Lois. Along the roadsides from Rossville to the sand barrens were found *Bromus tectorum* L.; the bulbous buttercup, *Ranunculus bulbosus* L.; *Lepidium apetalum* Willd.; the common vetch, *Vicia sativa* L., clambering over the herbaceous vegetation; and the yard form of *Viola papilionacea* Pursh.

On the barrens several new finds were recorded: *Carex folliculata* L.; spiderwort, *Tradescantia virginiana* L.; *Unifolium canadense* (Desf.) Greene, very abundant; the stargrass, *Hypoxis hirsuta* (L.) Cov.; *Sisyrinchium arenicola* Bicknell; two flowering plants of the stemless ladies' slipper, *Fissipes acaulis* (Ait.) Small; low thorny shrubs of *Crataegus uniflora* Muench.; *Aronia atropurpurea* Britton; *Rubus nigrobaccus* Bailey; wild ipecac in flower; frostweed, *Crocanthemum canadense* (L.) Britton; sheep laurel, *Kalmia angustifolia* L.; the white swamp azalea, *Azalea viscosa* L. One small shrub of *Ilex opaca* Ait. was seen. The holly is very rare on Staten Island now; formerly it was probably more plentiful here, before there was such a demand for it as a Christmas green.

Along the brook which flows through the barrens, *Viola cucullata* Ait. was in bloom. A box turtle was found near the stream, shedding the plates of its shell. The plastron of the shell of this tortoise is provided with a remarkable double hinge; which pulls the front and rear ends up close to the carapace in times of danger, and serves as a great protection from enemies. Small zigzag banks of earth, four or five feet high, which had been built many years ago along the stream, remained quite intact, being held together by a shrubby and herbaceous growth. Dr. Arthur Hollick afterwards told me that these were built for the cultivation of water-cress. The stream was full of golden saxifrage, *Chrysosplenium americanum* Schwein., which had nearly choked out the surviving cress.

In the woods about the clay pits the wild pink, *Silene caroliniana* Walt., grew sparingly; *Arabis lyrata* L.; black huckleberry, *Gaylussacia baccata* (Wang.) C. Koch; late low blueberry,

Vaccinium vacillans Kalm; blue toad-flax, *Linaria canadensis* (L.) Dum. and rattlesnake-weed, *Hieracium venosum* L., with basal leaves green and purple-veined were also found. In the woods west of Kreischerville a small patch of primrose-leaved violet in bloom; and along the road, escaping from old gardens, the star-of-Bethlehem, *Ornithogalum umbellatum* L., were noted.

These were some of the more conspicuous plants which were recorded in my notebook. To those who are unfamiliar with the flora of New York City, the metropolis would seem an uninteresting botanical field. This is only one of the many excursions that may be taken in the city, and much of the original flora still exists.

HUDSON FALLS, N. Y.

OBSERVATIONS ON CALOPOGON PULCHELLUS IN LAKE CO., INDIANA

BY EDWIN D. HULL

This species, which is fairly abundant near Hammond, differs widely in its time of flowering according to the habitat in which it grows. The 7th edition of Gray's Manual gives July as the flowering time in the range covered by that book. In this region, however, it may bloom nearly a month earlier. Here among the beach ridges of the old Lake Chicago plants are to be found in two very different habitats. More numerous and vigorous plants are found in depressions between the ridges with a typical swamp or bog flora. In one of these depressions I found *Calopogon* very abundant. Occurring with it were various species of true moss, a little *Sphagnum*, *Equisetum arvense*, *E. fluviatile*, *Lycopodium inundatum*, *Carex Oederi pumila*, *Pogonia ophioglossoides*, *Liparis Loeselii* and *Drosera rotundifolia*. Most of these, although not all, are typical bog forms. This particular depression, therefore, partakes more of the nature of a bog than an ordinary swamp. It is evidently fed by springs, and standing water can be found the year round. All the other depressions about it contain only the ordinary swamp flora. Here in this bog

Calopogon does not flower until the time usually supposed for this species. My earliest record is July 4, 1912.

About a mile distant from this bog less numerous and more dwarfed plants of *Calopogon* are found still persisting although the swamp which was its original habitat has now become dry (I believe through drainage), and is being invaded by the black oak (*Quercus velutina*) preceded by the characteristic fern of the oak associations in this region, *Pteris aquilina*. In the remaining open area of this swamp *Calopogon* has entirely disappeared. Typical bog forms as *Drosera rotundifolia*, if indeed they ever existed, have also disappeared. The remaining swamp flora is becoming much dwarfed, and doubtless will soon vanish. The only swamp form which seems to be holding its own is *Viola lanceolata*. *Aspidium thelypteris* and *Osmunda regalis* were extremely dwarfed, the latter infertile. Of *Iris versicolor* a single specimen remained. Of numerous specimens of the button-bush (*Cephalanthus occidentalis*) all were dead except for a few dwarfed shoots from the base. *Calopogon* here, although not found in the open, occurs in fair numbers at the bases of the black oaks at the edge of the swamp. In such a habitat it blooms about a month earlier than do those of the bog. My earliest record is June 3, 1911. Of course, plants in both situations may bloom earlier or later according to the fluctuations of the weather. In June of the present year (1913) I found at the base of a black oak about ten feet in height 39 specimens of *Calopogon* mingled with such forms as *Euphorbia corollata*, *Viola sagittata* and *Phlox pilosa*. A short distance from the base of the tree, more in the open, but not over ten feet away, were such characteristic plants of dry sandy soil as *Pteris aquilina*, *Lupinus perennis*, *Tephrosia virginiana*, *Helianthemum canadense*, and *Viola pedata lineariloba*. As before stated, all the specimens of *Calopogon* are much dwarfed. The largest number of flowers found in a single raceme was five. Even this small number was exceptional. Three was the average number, and often there were only two or even one. The plants farthest from the base of the tree usually consisted of the leaf only. The early blooming of *Calopogon* in this habitat is doubtless due to the well-known causes which induce early flowering, namely, drought and high temperature.

Certain orchids have been cited as indices of the xerophytic nature of bog habitats. *Calopogon* is a typical bog orchid. That it is able to persist in this undoubtedly xerophytic black oak association might appear to some to be a good proof of the xerophytic character of this species. I cannot believe, however, that this is the case. That it is able to persist at all is no doubt due to the greater accumulation of moisture at the base of the oak, with the possible further advantage of a certain degree of shade, although this species typically occurs in the open. If the plant is xerophytic it should be able to persist in the open dried-up swamp, where it does not. In nearly all the plants observed here the leaf was dead and shriveled for about an inch from the apex. A greater degree of shading will, however, certainly eliminate this species, and it is evident that it must eventually disappear as the surrounding vegetation becomes more dense.

CHICAGO, ILL.

SHORTER NOTES

A NEW SENECIO FROM CUBA.—In the writer's recent paper on "New Species of Cuban Senecioneae" *Senecio pachylepis* was contrasted with *S. eriocarphus*. Both species were characterized from specimens secured by Mr. J. A. Shafer during his botanical explorations in eastern Cuba but the description of the latter species was unfortunately omitted. It may be recorded as follows:

Senecio eriocarphus Greenman, n. sp. Caulis lignescens 1.5–2.5 dm. altus; ramulis ultimis juventate teretibus dense hirsuto-tomentosis; foliis alternis petiolatis coriaceis oblongo-obovatis vel oblanceolatis 2.5–8 cm. longis .5–3 cm. latis supra glabris subtus primum tomentulosis mox glabratis vel in nerviis plus minusve persistenter pubescentibus ad apicem acutis vel obtusis integris remote sinuato-dentatis, marginibus plerumque revolutis; petiolis usque ad 1.5 cm. longis plus minusve hirsuto-tomentosis; inflorescentiis terminalibus dense cymosis sessilibus fulvo-tomentosis; capitulis calyculatis discoideis; squamellis calyculatis linearis vel subspathulatis 3–5 mm. longis; involucri squamis 8

lanceolatis vel oblongo-lanceolatis 4–6 mm. longis acutis vel obtusis extrinsecus dense lanato-tomentosis; floribus 10–12; pappi setis ca. 4 mm. longis; acheaniis striatis hirtellis. On trail from Camp Toa to Camp La Barga, Province of Oriente, Cuba, altitude 400–450 m., 22–26 February, 1910, *J. A. Shafer*, No. 4149 (herbarium Field Museum, catalogue No. 294789, herbarium N. Y. Bot. Gard., fragment and photograph in herbarium Mo. Bot. Gard.); Camp La Gloria, south of Sierra Moa, Province of Oriente, Cuba, 24–30 December, 1910, *J. A. Shafer*, No. 8257 (herbarium Field Museum, catalogue No. 294806, herbarium N. Y. Bot. Gard., fragment and photograph in herbarium Mo· Bot. Gard.

The species here characterized resembles *Senecio pachylepis* Greenm., but differs in the character of the tomentum, in the conspicuously wooly bracts of the involucre, and in the slender bracteoles.

J. M. Greenman

Mule as a botanical term.—In *The Botanic Garden*, containing the "Loves of the Plants," which is also entitled "A Poem with Philosophical Notes," there occurs an old but now little known use of the word *mule* to designate a hybrid.

This unsigned poem published by J. Moore, of Dublin, in 1790, contains among the copious annotations of this fantastical and most amorous life of the flowers many curious statements and theories. Though given in the larger dictionaries, many students of botany state that they have never heard the term *mule* used for a plant hybrid. It seemed, therefore, worth while to reprint part of one of the footnotes containing the word.

"There is a kind of pink called Fairchild's mule, which is here supposed to be produced between a *Dianthus superbus*, and the *Caryophyllus*, Clove. The *Dianthus superbus* emits a most fragrant odour, particularly at night. Vegetable mules supply an irrefragable argument in favour of the sexual system of botany. They are said to be numerous; and, like the mules of the animal kingdom, not always to continue their species by seed. There is an account of a curious mule from the *Antirrhinum linaria*, Toad-flax. . . . Amongst the English indigenous plants,

the veronica hybrida mule Speedwel is supposed to have originated from the officinal one; and the spiked one and the *Sibthorpia Europaea* to have for its parents the golden saxifrage and the marsh pennywort. . . . Mr. Graberg, Mr. Schreber, and Mr. Ramstrom, seem of the opinion, that the internal structure or parts of fructification in mule plants resemble the female parent; but that the habit or external structure resembles the male parent. . . . The mule produced from a horse and the ass resembles the horse externally with his ears, mane, and tail; but with the nature or manners of an ass: but the Hinnus [hinny], or creature produced from a male ass, and a mare, resembles the father externally in stature, ash-colour, and the black cross, but with the nature or manners of a horse."

JEAN BROADHURST

REVIEWS

Ganong's The Living Plant*

This book is the second number in division III, Functions of Nature, of The American Nature Series, the first number being Beebe's "The Bird." It is the announced aim of the series as a whole to furnish "a series where the nature-lover can surely find a readable book of high authority"; and the books of the third division of the series "treat of the relation of facts to causes and effects—of heredity and the relations of organism to environment."

The author's experience as a teacher, and as an investigator and writer, admirably fitted him for the preparation of this work. It was not an easy task; not as easy as might at first be imagined, for while "botany" is, in a sense, a popular science, its popularity diminishes approximately as the square of the distance from the "how-to-know-the-wild-flowers" phase of it, from which the book under review is a wide departure.

The book is unique, being the only attempt (so far as known to the reviewer) to popularize the entire range of plant physiology.

* Ganong, William F. The Living Plant. A Description and Interpretation of its Functions and Structure. Pp. i–xii + 1–478. *f. 1–178.* New York, Henry Holt & Company, 1913. Price $3.50 net.

Although not addressed to the author's colleagues (p. v) it will surely (and ought to) receive a share of their attention, and parts of it will call forth the protests of some of them, and the antagonism of others. For example, Darwinian adaptation is advocated (p. vi and throughout the text), and the corresponding language of purpose is used—"Experiential purpose, which does not presuppose any forethought." We are told (p. 334) that plants really do "reach up after light"; that the need of light for stems and the injuriousness of light to the unprotected protoplasm of roots is the "reason" (p. 227) for their characteristic phototropism; that parthenogenetic reproduction has been adopted by certain Compositae because it would be "natural" for them "to preserve their characteristics unchanged by resorting to asexual propagation."

But these forms of expression are perfectly logical for one who believes (p. 326) that it is "scientifically correct as well as practically convenient, to personify nature." From this the reviewer must emphatically dissent. He believes that nothing has been more potent in retarding the development and advancement of experimental inquiry in the past than the willingness to accept final causes with satisfaction as really explaining the phenomena of nature. This tendency is still strong, and to combat it at every point is one of the duties and opportunities of the writers of "popular" science.

The author is a vitalist in that he assumes "the existence in Nature of an X-entity, additional to matter and energy but of the same cosmic rank as they" (p. viii). The "most reasonable explanation of the phenomena of organic nature" is held to be "that all of the life processes are subordinate to some influence which is using living matter as a seat for its operations." All protoplasm thinks (p. 14). The reviewer is here an agnostic, but he believes that to ascertain the truth on this point is the most fundamental and important problem, indeed the ultimate goal of all biology. The mechanistic conception of life is fraught with too serious a meaning for human beings to be accepted without a challenge at every possible point and place. It is well, therefore, to have a vitalistic point of view clearly set forth, and

probably a popular treatise is not the place to argue the question in detail, yet the other side, as an alternative possible conception, ought to be clearly stated. The author's advice (p. 15) to the reader to read this chapter last, or to re-read it after he has finished the rest of the book, is a wise one.

The reviewer has dwelt, perhaps over long, on these philosophical aspects of the book, because he personally feels that the real importance and value, as well as the real weaknesses, of popular science lie in what it does for the lay mind in just this connection. It is more important to be intelligently and (so far as possible) correctly informed with reference to these larger and fundamental problems than merely to know the wild flowers, or to understand the "facts" of physiology and ecology. Correctly to orient the reader on such questions is one of the most important services that "popular" science can render.

The book is well knit together, admirably illustrated with cuts, mostly either new or original with the author, and where the reviewer feels that the interest of the lay reader might possibly lag, he feels that the reason is to be found in the nature of the materials with which the author is dealing, rather than with the method of treatment. In fact, the reviewer believes that the first 223, out of a total of 445 pages, are devoted to those phases of plant life that are of least popular interest. It was almost humiliating to be forced to the conviction that respiration, photosynthesis, transpiration, etc., are not of great popular interest. The reviewer would like to think otherwise, and once did, but experience with classes has forceed him to a change of view.

The author himself seemed aware (cf. pp. 37, 73, 97, and 194) that the chapters were, in general, too long, and in many instances they could have been divided naturally and to great advantage.

In light of the general high excellence of the book as a whole, it seems almost puerile to call attention to the fact that "cells" are defined (p. 20) as "always compartments of some sort"; that radium "emanations" (there is only one radium emanation) are referred to (p. 251); that capillarity is defined (p. 179) as a force; that chromosomes are said to "embody within themselves

the characteristics of the parent plant"; that (in the light of recent work by Pond and others) solution is given (p. 359) as one of the ways by which branch roots make their way through the cortex; that Plateau's experiments (of really popular aspect) are ignored in discussing the significance of flower color in pollination by insects; and that the statolith hypothesis is treated (p. 248) as a generally accepted, correct explanation of geotropism.

Natural selection is still held (p. 409) to explain "very perfectly" the *origin* of new species; in fact, in the light of the *Die Mutationstheorie*, and all the work that has followed from it, this statement and the first half of page 411 read almost like anachronisms.

To list the good points of the book not previously mentioned would require more space than has already been occupied. The endeavor on the part of professional scientific men to popularize their work; to prepare for the layman a readable account of the present status of their science, equally free from unnecessary technicalities, and from statements exaggerated, distorted, or otherwise misleading in the attempt to simplify, and to invest the subject with interest which it is supposed otherwise to lack, is a labor very much worth while, and too frequently left to tyros. One conspicuous value of the book under review is that it acquaints the reader, not only with the results of botanical study, but also with the methods of thought and work by which such knowledge is ascertained. It is unfortunate that the book is much too heavy to be held comfortably in the hands while reading.

C. Stuart Gager

NEWS ITEMS

During Dr. D. T. MacDougal's trip through the Sudan and the Egyptian Desert in January and February, 1912, a considerable collection of herbarium specimens was made and later submitted to Dr. A. B. Rendle and other members of the staff of the department of botany of the British Museum of Natural History. The collection is enumerated by Dr. Rendle in the

September issue of the *Journal of Botany*, and Dr. MacDougal's visit to these regions is commemorated in *Geigeria Macdougalii*, from hill slopes at Sal Lom, Red Sea Province, described by Mr. Spencer Moore.

Mr. W. W. Eggleston left Washington the last of April and returned the 18th of September with over one thousand field numbers for the summer's collection. The first ten days of May were spent about Greycliff, Mont. Then short stops were made at Sidney, Neb., and Medicine Bow, Wyo., on the route to the Stanislaus National Forest, California. From May 19 to July 25, the time was spent about Sonora, California. During the first three weeks of August, Mr. Eggleston was in the region stretching from Lake Pend D'Oreille, Idaho, to the British Columbia line. On the return trip to Washington, Dr. Aven Nelson's Rocky Mountain herbarium was visited.

Frederick S. Page, a graduate of Dartmouth College of the class of 1913, has been appointed curator of the herbarium of the University of Vermont, succeeding the late C. G. Pringle.

Among the European members of the International Phytogeographic Excursion, who have been travelling in the United States since the last of July, and who stopped in New York en route home, were Professor Carl Schröter, of Zurich, and Professor Adolf Engler, director of the Royal Botanical Garden at Berlin. Professor Schröter delivered a lecture on the flora of the Alps, under the auspices of the department of botany of the Brooklyn Institute of Arts and Sciences and the Brooklyn Botanic Garden, October 8. Dr. Engler planted a tree at the Brooklyn Botanic Garden, on October 16, and the next day visited the New York Botanical Garden, where he was the guest of honor at a dinner given by Dr. N. L. Britton, at L'Hermitage, at which twenty-five botanists were present.

At a meeting of the scientific directors of the New York Botanical Garden, held October 11, the publication of the work of Mr. Norman Taylor on the local flora was authorized. The book will now be issued as rapidly as possible.

Mr. George R. Johnstone (A.B., 1913, University of Illinois) has been appointed instructor in botany at the Michigan Agricultural College.

Greenheart, the wood which the Isthmian Canal Commission is desirous of securing for use in the construction of docks and similar works in the Panama Canal, because it is said by experts to resist more than any other wood the attacks of marine borers which rapidly destroy piles and other submarine structures, is one of the most valuable of timbers. It is native of tropical South America, and from its bark and fruits is obtained bibirine, which is often used as a febrifuge instead of quinine. The tree is *Nectandra Rodiaei* of the Lauraceae. The wood is of a dark green color, sap wood and heart wood being so much alike that they can with difficulty be distinguished from each other. The heart wood is one of the most desirable of all timbers, particularly in the shipbuilding industry. Indisputable records show that the best grades surpass iron and steel in lasting qualities in salt water, submerged logs having remained intact for one hundred years. In the Kelvingrove Museum, Glasgow, there are two pieces of planking which illustrate better than anything else this durable quality. They are both from a wreck which was submerged eighteen years off the west coast of Scotland. The one specimen—greenheart—is merely slightly pitted on the surface, the body of the wood being perfectly sound and untouched, while the other—teak—is almost entirely eaten away. It is extensively used in shipbuilding for keelsons, beams, engine-bearings, and planking, and it is also used in the general arts, but its excessive weight unfits it for many purposes for which its other properties would render it eminently suitable. (*Evening Post*, 18 October.)

Miss Florence A. McCormick, M.S. (Chicago), took up her duties as adjunct professor of agricultural botany at the University of Nebraska on October first.

The Torrey Botanical Club

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* Died February 1, 1913.

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A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

NORMAN TAYLOR

JOHN TORREY, 1796–1873

CONTENTS

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NORMAN TAYLOR
Brooklyn Botanic Garden
Brooklyn, N. Y.

* Died 14 September 1913.

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December, 1913.

Vol. 13 No. 12

SOME PLANTS FROM THE VICINITY OF LONGS PEAK INN, COLORADO

By T. D. A. Cockerell

During the latter part of June, my wife and I visited Longs Peak Inn, where the versatile Enos Mills tries to convert a more or less philistine public to some appreciation of the ways of nature, and in his leisure moments writes charming books describing the fauna and other features of the region. Mr. Mills describes his place as a wild flower garden, and has posted up a notice requesting visitors not to wantonly and wastefully pick flowers. Those who will not heed, claiming that it is their inalienable right to destroy as much as they please, are politely informed when the next car leaves the Inn. The flora of Estes Park and Longs Peak have been studied by two generations of visiting botanists, and one might suppose that there would be little new to record. In a sense, however, we are still at the beginning of our botanical studies in that region. Our manuals are necessarily so condensed that they omit almost everything beyond the barest taxonomic facts, and this brevity reacts upon botanists using them, who are usually ready to dismiss a plant, when duly identified, as "well known." Not only does our taxonomic treatment need much revision in the light of careful field work, but there are innumerable problems to be solved, connected with variation, methods of pollination, and what not. Thus any visitor may find out some interesting things even in a couple of days, or may regard from new points of view facts long ago recorded in the books. The following notes merely illustrate this point, and are based upon observations made during three days (June 24–26) at altitudes from about 7,500 to 11,400 feet.

[No. 11, Vol. 13, of Torreya, comprising pp. 249–264, was issued 30 October 1913]

The citations of "Nelson" and "Rydberg," without reference to volume or page, refer always to the well-known works by these authors treating of the plants of Colorado.*

A special effort was made to find orchids, but only the three following species were obtained.

1. *Limnorchis viridiflora* (Chamisso) Rydb. In a swampy place at Estes Park Village.
2. *Lysiella obtusata* (Pursh) Rydb. Longs Peak Inn. Found by my wife, who was so fortunate as to observe a moth visiting the flowers, evidently serving as an agent in pollination. A specimen captured carries a bright yellow pollinium on its head, the base of the stalk attached to the front of the moth's left eye. The moth proves on examination to be a perfectly typical *Rheumaptera tristata* (L.), a species common to the northern parts of America and Europe. Rydberg states that *Lysiella obtusata* occurs in a single European locality, in northern Norway. It is interesting to know that it may there be visited by the same species of moth.
3. *Coeloglossum bracteatum* (Willd.) Parl. Longs Peak Inn. Found by my wife. This appears to be very rare in Colorado; Rydberg merely cites it from Colorado, adding "exact locality not given." Nelson gives the distribution as "Northern Wyoming, eastward and to the Atlantic," thus excluding Colorado altogether. Our plant is perfectly characteristic of the species.
4. *Populus tremuloides minor* Cockerell, 1891. (Nature Notes, p. 14.) Abundant about Longs Peak Inn. This is the earlier name for the western aspen, but if it is regarded as a distinct species, it will according to the botanical rules stand as *P. aurea* Tidestrom, 1911.
5. *Bistorta bistortoides* (Pursh) Small. A common plant of meadows at Longs Peak Inn, alt. 8,956 feet. In Washington State, Piper cites this as a species of the Arid Transition Zone; with us it is especially characteristic of the Canadian.

* Coulter and Nelson, New Manual of Botany of the Central Rocky Mountains, January, 1910; P. A. Rydberg, Flora of Colorado, 1906.

6. *Silene acaulis* L. Abundant above timber line on the trail from Longs Peak Inn to Longs Peak. The petals are a delicate pale pink, varying to whitish. In Schinz and Keller's Flore de la Suisse, they are described as "carnées," which may pass; but there is no excuse for the descriptions of our American manuals, "purple or purplish" (Britton and Brown; Nelson); "purple, or rarely white" (Coulter); "purplish, rarely white" (Synoptical Flora). Our plant has the petals strongly emarginate at end. Britton and Brown say there is a scale at the base of the blade; Nelson says "a small scale at the summit of the claw." As a matter of fact there are two flattened fleshy lobes, contrasting with the pink of the blade.

7. *Caltha leptosepala* f. **chionophila** (*Caltha chionophila* Greene). The *Caltha* growing abundantly in damp depressions above timber line is certainly only an alpine form of the species common in the Canadian Zone below. There are two types of high alpine modification, that due to the direct effect of the environment on the individual (as has been actually proved in Europe by transferring plants to lower altitudes), and that which is inherent in the constitution of the plant. Presumably those plants which are permanently modified, so that they retain their peculiarities when grown at lower levels, or refuse altogether to grow below the high alpine zone, have longest occupied alpine situations. No doubt in some cases both types of modification exist in the same plant, and in the case of plants changing by direct response to climatic conditions, those having gametic variations in the same direction would no doubt be favored in the struggle for existence, such variations tending to make the necessary response more certain or more complete. Another case analogous to that of the *Caltha* is seen in the common *Frasera* of the Longs Peak region, which extends to timber line, where it assumes a singular dwarfed appearance, exactly as if the plants had been broken off by some one in the middle, and then stuck in the sand.

8. *Pulsatilla hirsutissima* (Pursh) Britton. We were much interested to find this, in perfectly typical form, growing sparingly above timber line (at about 11,300 ft.) on the Longs Peak trail, some of the plants not yet through flowering.
9. **Cheirinia Cockerelliana** (*Erysimum Cockerellianum* Daniels, Univ. of Mo. Studies, 1911). Very abundant, running to very rich shades of orange and brownish-orange, all about Longs Peak Inn, and up into the Hudsonian Zone. This is surely not the *Erysimum Wheeleri*, described from San Francisco Mountain, Arizona, though specimens in the herbarium will look much alike, *E. Wheeleri* being much too large to preserve entire, at least when fully grown.
10. **Cheirinia nivalis radicata** (*Erysimum radicatum* Rydberg). Abundant above timber line on the Longs Peak trail. The leaves are more or less sinuate-dentate, and the plant is certainly *radicatum*, but it can hardly be doubted that Nelson is correct in regarding this as conspecific with *C. nivalis* (Greene) Rydb. The oldest name for the aggregate is *Erysimum asperum nanum* Cockerell, Nature Notes, 1891, p. 15; I think, however, that the species is a valid one, and according to the botanical rules Greene's name takes precedence. It is certainly very striking to come out of the forest, where *C. Cockerelliana* is so abundant, and find taking its place a species not only of lower stature, but almost uniformly with clear yellow flowers. I should have said quite uniformly so, had I not found a single plant with reddish petals, the purplish pigment being so arranged as to leave yellow streaks and margins, an arrangement quite different from that of *C. Cockerelliana* in which the anthocyan pigment is diffused. I have never collected *C. amoena* (Greene) Rydb., which is like *nivalis* but is said to have flowers colored like those of *Cockerelliana*. It is, I suppose, a derivative of *nivalis*, originating in some such form as my single sport described above, and not a variety of *cockerelliana*. In addition to the sport described, some of the plants with pure yellow

flowers had the apical half of the sepals purplish. In western Europe, the species of *Cheirinia* have yellow flowers, so that this character is one of those used to conveniently separate the genus from *Cheiranthus*, which ranges through the same colors as *Cheirinia Cockerelliana.*

11. *Sedum stenopetalum rubrolineatum* Cockerell, 1891. This strongly reddened form is the phase of the species regularly occupying high altitudes; extremely abundant from Longs Peak Inn to timber line, affording food to the larva of the beautiful butterfly *Parnassius.* I brought a couple of plants to Boulder, to grow in the garden, to see whether the red color is permanent at a lower altitude, though I can hardly doubt that it will prove so. This appears to be identical with *S. subalpinum* Blankinship, 1905, which is said by that author to occur in "alpine and subalpine situations," "passing below into *S. stenopetalum.*" I do not think it can possibly be regarded as a distinct species, and in this opinion I have the support of Dr. N. L. Britton (litt., Oct., 1905). It is, however, a good race.
12. *Dryas octopetala* L. This beautiful plant was found in abundance at and above timber line, looking just as it did when I found it some years ago on the top of the Rigi, in Switzerland.
13. *Primula angustifolia* Torrey. Common above timber line. This is an excellent example of a permanently modified alpine plant. By the form of the seed capsule and leaves, this falls in a different section of the genus from *P. Parryi* of the Hudsonian Zone in Colorado. It is in fact an isolated species in the Rocky Mountain Flora, nearest to *P. Cusickiana* of Oregon, and more or less related to the Old World *P. nivalis.*
14. *Androsace carinata* Torrey. Abundant above timber line. Coulter says the corolla is white with a yellowish eye, and this is true of half or more of the plants; but a very common phase has the "eye" bright pink. Our plants were studied in the *exact* type locality of *Douglasia John-*

stoni A. Nelson. The types of Nelson's description were obtained too late in the year to show the color of the corolla. The form with the pink "eye" may be known as mut. **nelsoni**, nov.; the closely related Old World *A. chamaejasme* varies in the same manner. The color variation is apparently somewhat obscured by differences due to age, but there are two types, one with, the other without, the red pigment. The carination of the leaves is really very slight. Nelson has separated this species from *Androsace* as the type of a genus *Drosace*. It is possible that a genus may be maintained for this and related caespitose forms, but if so, the name must apparently be *Aretia* Linné, based on the Old World *Aretia alpina* L. It is true that typical *Aretia* has the peduncles one-flowered, but there is no absolute line of division here, since *Androsace coronata uniflora*, from the Himalayas, has one or sometimes two flowers on a stalk.* This is a species very closely related to our *A. carinata*.

The *Primula* and *Androsace* here discussed represent the arctic-alpine flora derived from that of the Old World, and seeming in a way out of place in our country, like the alpine poppy. It is curious that even so far north as the State of Washington, according to Piper, there is no *Primula* or *Androsace* whatever.

15. *Phlox caespitosa* Nuttall. Abundant above timber line. The flowers are of a peculiar light blue, just like the common greenhouse *Plumbago*.

16. *Polemonium confertum* Gray. This magnificent species is abundant above timber line. In one place a variety with white flowers (mut. **albiflorum** nov.) was quite common. This would seem to run in Nelson's key to *P. mellitum*, which is a distinct species of lower altitudes (*e. g.*, Sunset, Boulder County, fide D. M. Andrews). On comparing blue and white flowers growing close together, I noted that the stigmatic branches were longer in the white

* *Androsace coronata* (*A. chamaejasme* var. *coronata*, Watt. Journ. Linn. Soc., 20); *A. coronata uniflora* (*A. chamaejasme* var. *uniflora*, Hooker f., Fl. Brit. Ind., 3).

flowers, but otherwise the plants were exactly alike. The white flowers do not show any blue at all in life, but on drying the ends of the corolla lobes turn bluish, showing that anthocyan is not entirely absent.

17. *Eritrichium argenteum* Wight ("*argentum* White" in Rydberg). Common above timber line, the flowers the brightest possible blue.

18. *Pentstemon glaucus* Graham. Not very common along the trail above Longs Peak Inn, at about 10,000 ft. (Hudsonian Zone). In life this is a very curious and singularly inconspicuous species, the flowers a sort of dark purplish red. Herbarium specimens give no good idea of its true appearance. Our plant is *glaucus*, not *stenosepalus*.

19. *Castilleja occidentalis* Torrey. A small, very inconspicuous species, with orange-tipped bracts (no sign of red), was common above timber line. I suppose it to be *occidentalis*, but we have in the University of Colorado herbarium specimens of a different plant, a reduced form of *C. sulphurea* or very close thereto, determined as *occidentalis* by Nelson.

20. *Castilleja*, hybrid? Near Longs Peak Inn we found a number of plants of *C. sulphurea* Rydb. (here using the name, with Nelson, to include *luteovirens*), and along with them some variable forms which were taken, in the field, to be hybrids with *C. confusa* Greene. A characteristic example of the supposed hybrid has the bracts greenish yellow, broadly tipped with pale red. The foliage does not differ at all from that of *sulphurea;* thus the leaves are too broad for *confusa*. The stem is hairy, which is not true of *sulphurea*. The reddest plants found at this particular spot have the calyx deeply cleft in front and behind, but only briefly so at the sides, thus not according well with *confusa*. It is possible that all the plants colored with red should be referred to *C. rhexifolia* Rydb., which may in fact be of hybrid origin. I should hardly offer these notes on *Castilleja*, except to point out the necessity for further study in the field. Nelson and

Rydberg disagree greatly as to the limitations of the species of *Castilleja*, and it is probable that much remains to be done before the Colorado species are properly understood. It can hardly be doubted that hybrids are more or less frequent.

21. *Rydbergia grandiflora* (T. & G.) Greene. This species, with its large orange heads, was very conspicuous everywhere above timber line. It is one of the very few plants of austral origin which have pushed their way up into the high alpine zone, being in fact a sort of glorified *Hymenoxys* or *Tetraneuris*. It is singular that the one member of this alliance which has reached these seemingly inhospitable heights should have by far the finest and largest flower-heads of all.
22. *Artemisia scopulorum* Gray. Common above timber line; a genuinely alpine species, apparently not found in the zone below.
23. *Senecio rosulatus* Rydberg. Abundant on dry hills at Estes Park Village. At one place we found several plants of a form (mut. **primulinus**, nov.) with pale primrose-yellow rays; a variation analogous to that seen in the cultivated "primrose" sunflower.

Palaeobotany teaches us that many of the better defined genera of plants are of enormous antiquity. The careful work of C. and E. M. Reid has shown that modern species at least commonly date as far back as the Pleistocene, while in a number of instances there appears to have been no appreciable change since the Pliocene. On the other hand, the living flora is constantly mutating, producing variations or sports, which follow well established lines and can almost be predicted. It is as though we had before us a seething mixture, in which different elements came to the surface from time to time. The red sunflower, originating, so far as we know, in a single plant found by the roadside in Boulder, was a striking novelty among sunflowers. In spite of the enormous numbers of the *Helianthus annuus* group growing wild and in cultivation, no one, so far as can be determined, had ever seen such a plant before. Never-

theless, in its original form, and in the various combinations and modifications produced during the last few years in cultivation, the red sunflower merely follows the path already well worn by other genera of Compositae, such as *Helenium* and *Gaillardia*. Just as in the orange and orange-brown forms of *Cheirinia*, it is simply a matter of the increase of anthocyan pigments. Characters of this sort frequently become diagnostic of species; or originating somewhere, being inherited in Mendelian fashion, produce a well-marked dichroic condition in a type previously nearly uniform. In the case of the red sunflower, "red" plants are already beginning to appear in various places about Boulder, the pollen having been carried from our garden by bees. It will be interesting to see whether, in a number of years, the "red" variety becomes established as a regularly occurring variation in the wild flora; and if it does so about Boulder, whether it will gradually spread over the plains. Such questions are certainly interesting and make it abundantly worth while to closely study and describe variations as they are found to occur.

SHORTER NOTES

SCLEROCARPUS AFRICANUS JACQ. IN AMERICA.—The composite genus *Sclerocarpus* is interesting as having its type species in tropical Africa and its others in warm temperate and tropical America. The object of this note is to record the occurrence of *S. africanus* Jacq. on the Island of St. Thomas, Danish West Indies, where a solitary plant was found on a sandy beach near Charlotte Amalia in February, 1913 (*Britton, Britton & Marble 483*); only one plant could be found after an hour's search of the locality, and it therefore seems probable that this is a waif.

N. L. BRITTON

TWO NEW AMERICAN GRASSES.—**Schizachyrium curasavicum** sp. nov.

Annual. Stems 1–2 dm. tall, branched, glabrous; leaf-sheaths smooth and glabrous, keeled; blades up to 8 cm. long, 3–4 mm. wide, flat, linear, gradually narrowed above to an acute point, glabrous on the keeled lower surface, the upper surface sparingly

tuberculate-hirsute with long hairs; spathes 2–3 cm. long; racemes about 2 cm. long, the internodes oblique at the deeply cup-shaped apex, these and the pedicels appressed-hirsute with long hairs below on the back, the internodes long-barbate at the base; sessile spikelets 5–6 mm. long; first scale involute, appressed-hirsute with long hairs, long-acuminate, strongly 2-nerved at the apex, these nerves and the intermediate ones very faint below; flowering scale hyaline, delicate, cleft to below the middle, the awn 8–12 mm. long, the tightly spiral deep brown column about as long as the yellowish subula; pedicellate spikelet about 1.5 mm. long, with a scabrous awn about 3 mm. long.

Rocky hill, St. Joris Bay, Curaçao, Britton & Shafer, March 20–27, 1913, no. 3101.

Lasiacis Harrisii, sp. nov.

A branched perennial, of slender climbing habit, with long narrowly lanceolate leaf-blades and linear strict panicles. Stems slender, up to 5 m. long or more, smooth and glabrous; leaf-sheaths glabrous or sometimes ciliate, usually shorter than the internodes; ligule a scarious ring 1 mm. wide or less; blades narrowly lanceolate, 5–12 cm. long, 4–7 mm. wide, glabrous, rough on the margins, long-acuminate at the apex, erect or nearly so; panicle 3–6 cm. long, linear, strict, its branches short and appressed; spikelets 3.5–4.5 mm. long, the scales woolly-tipped, the first scale orbicular, obtuse, about one half as long as the spikelet.

At high elevations in Jamaica. Type collected in the vicinity of Cinchona by Delia W. Marble, Sept. 2–10, 1906, no. 222. Other specimens are: Below Cold Spring Gap, Harris 11,354; Mt. Faraway, Blue Mts., Harris 11,486; Strawberry Hill, Blue Mts., Harris 11,487; base of Catherine's Peak, Harris 11,552; Abbey Green, Blue Mts., Harris 11,587; no locality, J. P. 793, 819.

George V. Nash

Burnham's Flora of the Sand Barrens of Southern Staten Island.—In the last number of Torreya the author of the paper under the above title gives an excellent presentation, with a very few exceptions, of the most interesting floral elements

peculiar to the southern end of Staten Island. Botanically he missed but little. His interpretation of the geology, however, is wide of the mark, and this is an important matter, for the reason that it is the geologic factor which must be taken into account in order to understand and appreciate the significance of the flora of the region. He mentions, for example, "the clay deposited here when the great Laurentian glacier moved down from the north." As a matter of fact the region is but little glaciated and over considerable areas there are no glacial deposits whatsoever. The clays which are such a prominent feature are Cretaceous in age and represent the northern extension of the Raritan formation of New Jersey. In other words this part of Staten Island is geologically and geographically a part of the coastal plain region of the mainland, which accounts for its peculiar and interesting flora.

Incidentally, also, the author is at fault in ascribing the presence of "salt-water clam shells" in the sandy upland as evidence "that at a comparatively recent period this portion of the Island was submerged." The clam shells represent old Indian "kitchen middens." A. Hollick

Some Legal Botany.—It was the peculiar privilege of the editor of Torreya to be present at a trial in a supreme court in greater New York where the following testimony was given by a florist, suing a gas company for the alleged escape of illuminating gas into his greenhouses and the consequent destruction of thousands of carnations. For obvious reasons names are omitted.

Q. What peculiar appearance did the carnations have, or the carnation buds have, during the months of December or January heretofore mentioned?

A. Instead of opening, instead of the bud opening, the stamen came out of the calyx.

Q. What do you mean by the stamen? What is that?

A. Well, there is two little—

Q. Is that known as the style.

A. Yes, sir; some call it styles.

The Court: I confess I don't know anything about botany. "The stamen came out of the calyx." That is all Greek to me, sir. Then, in order to explain it he says, "The stamen means

the style," which made it a little worse. I know the word stamen and the word style, but I don't know what either of them mean.

Q. What do you mean by stamen, or styles?

A. Well, there is two little round—I really don't know—there is two little round—it is like a round cord that comes out of the seed pod, and that come out of the flower, or the bud, rather, refused to open.

THE COURT: What is the calyx?

THE WITNESS: The calyx is the part that holds the leaves together.

THE COURT: And this stamen came out?

THE WITNESS: Yes.

THE COURT: The stamen is the thing that blossoms and makes the flower?

THE WITNESS: No, the stamen is into the seed pod, and that came out, and of course, that was as far as it could go.

REVIEWS

Coulter's Plant Life and Plant Uses*

Coulter's Plant Life and Plant Uses seems to the reviewer unfortunate in implying in title and in the subtitle that it is in any peculiar way "a foundation for agriculture, domestic science, and college botany." If a proportionate discussion of such subjects as weeds, yeasts and bacteria, and economic uses and relationships of plants would "seriously impair the unity of organization which should characterize a foundational text" the misleading subtitle should be changed.

The combination of conversational style and a large number of technical terms seems unfortunate also. There have appeared recently several high school text books which are as broad in scope, and which present more satisfactorily the several styles or treatments which the author has endeavored to combine in this book. Atkinson's Botany for Schools, as a type of the strictly academic, is far superior. The chapter-end questions are much better done by Andrews in the Practical Course in Botany; the questions in that are really thought-producing, while Dr. Coulter

*John Gaylord Coulter. Plant Life and Plant Uses. Pp. v–xvi + 1–464. *f. 1–230.* American Book Company, New York, 1913. Price, $1.20.

limits too many of his to "define," "describe," or the very indefinite "discuss." Most high school teachers need some indication of the kind and amount of laboratory work expected by the author; that has been one great advantage of the Bergen text books. The last, Bergen and Caldwell's Practical Botany, is surely just as readable and interesting as this, although it retains the text-book style. Among the books which have a better *foundation* for the title-page claims Bigelow's Applied Biology might be mentioned; their later Introduction to Biology has a most original arrangement of the recognized high school matter, and which is, nevertheless, logical. Dr. Coulter it would seem is unfortunate in the arrangement of subject matter, *e. g.*, discussing photosynthesis on page 43, just forty-six pages before he defines solutions, molecules, and compounds.

The illustrations are often insufficiently labeled (as in those of the root and stem, pp. 80–83, or in the flower diagrams on 291).

While Dr. Coulter, no doubt, makes botany a live subject in his own teaching, he has not, unfortunately, put into his book the many things the many unprepared teachers need to help them do their work.

JEAN BROADHURST

TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

Rock's The Indigenous Trees of the Hawaiian Islands *

This handsome work, published by the aid of thirty-three liberal patrons of botany, is a most useful and valuable presentation of the arborescent plants of the Hawaiian Islands. Technical descriptions of all species observed by the writer as trees, even if usually occurring as shrubs, are given, together with the native name, notes on uses of woods, fibers, leaves, fruits, oils and other products, and the distribution of the species within the islands and elsewhere. The illustrations are all photographs, either of isolated trees or of twigs showing flowers or fruit, sometimes both.

The descriptive portion of the work is prefaced by detailed accounts of the six botanical regions, (1) strand vegetation; (2)

* Large octavo, 516 pages with 215 plates, Honolulu, published June 26, 1913. By Joseph F. Rock.

lowland region, described as merging into the next and divided into a dry region and a wet region; (3) lower forest region, including a windward side and a leeward side section; (4) middle forest region, with four sections; (5) bog region; and (6) upper forest region, the latter extending from about 5,500 feet elevation up to 11,500 feet. An appendix contains descriptions of new species other than trees.

All concerned are to be cordially congratulated on the production of this book, which cannot fail to stimulate interest in plants within the colony, and is a very noteworthy contribution to science.

N. L. Britton

PROCEEDINGS OF THE CLUB

May 13, 1913

The meeting of May 13, 1913, was held at the American Museum of Natural History at 8:30 P.M. Dr. Marshall A. Howe presided. Sixteen persons were present.

The reading of the minutes of the previous meeting was dispensed with and Dr. John Davidson of Vancouver, B. C., was elected to membership.

The announced scientific program consisted of an illustrated lecture on "Correlations between Plant Associations and Soil Conditions in the Great Salt Lake Region," by Mr. Thomas H. Kearney. An abstract of this lecture has been published in Science, Vol. 37, March 21, 1913.

Meeting adjourned.

B. O. Dodge,
Secretary

May 28, 1913

The meeting of May 28, 1913, was held in the laboratory of the New York Botanical Garden. The meeting was called to order at 3:30 P.M. by Vice-president Dr. J. H. Barnhart. Ten persons were present.

The minutes of the meetings of April 30 and May 13 were read and approved.

In behalf of the board of editors, Dr. Marshall A. Howe reported it to be the judgment of the editors that the present

financial condition of the Club does not justify it in undertaking to publish a flora of the area within 100 miles of New York City, the manuscript for which is being prepared by Mr. Norman Taylor.

The announced scientific program consisted of a paper on "Probable Origin of the Alpine Plants of the Rockies," by Dr. P. A. Rydberg. A number of specimens of alpine plants illustrating the principal features of the paper were exhibited.

Meeting adjourned.

B. O. Dodge,
Secretary

October 14, 1913

The regular meeting of October 14, 1913, was held at 8:15 P.M. at the American Museum of Natural History, with President Burgess in the chair. Six persons were present.

The minutes of the meeting of May 28 were read and approved.

President Burgess as chairman of a special committee to prepare a suitable memorial of Judge Addison Brown read the following resolutions:

We, the officers and members of the Torrey Botanical Club, desire hereby to place on our records at this first meeting since the spring, this expression of our bereavement at the news then brought to us of the death of our late associate and former president, Judge Addison Brown. Be it therefore

Resolved, That we record our affectionate remembrance of the deep interest that he felt in the prosperity of the Club, both during and after his many years of presidency.

Resolved, also, That we express our recognition of the long and active service rendered by Judge Brown to the cause of botanical advancement in this city and country; as president of this club, as a founder of the New York Botanical Garden, and long the president of its Scientific Directors; and as coadjutor, with Dr. Britton, in the issue of the monumental Illustrated Flora.

Resolved further, That the above be entered on our minutes, and that a copy be sent to the family, with the respect and condolence of the Club.

The acting secretary, as chairman of a special committee to prepare resolutions in memory of E. L. Morris, read the following:

By the death of Edward Lyman Morris the Torrey Botanical Club has lost a member who had for many years taken a keen

interest in all its activities and in the promotion of its usefulness. He was a close observer and a painstaking student, interested in the broad aspects of scientific thought as well as in the narrower departments of systematic study.

His ready coöperation and enthusiasm won the affections of his associates and stimulated their endeavors.

During the last year of his life he discharged the duties of editor with unwearied devotion to the interests of the Club. Therefore, be it

Resolved, That the Club desires to place upon record its appreciation of his work as a scientist and his character as a man, and to express its deep sorrow at his death, and

Resolved, That the Club extends to his family its sincere sympathy and condolence, and

Resolved, That these resolutions be entered in the minutes of the Club and a copy of them be transmitted to his family.

In accordance with a long-established custom, the program for this, the first meeting of the autumn, consisted of informal reports on the summer's work of the members.

Dr. J. H. Barnhart reported attending the summer field meeting of the Connecticut Botanical Society at New London, Connecticut. *Utricularia resupinata*, a plant of special interest to the speaker, was found in great profusion around the shores of various ponds in that vicinity.

Mr. E. B. Chamberlain reported attendance upon the summer field meeting of the Josselyn Botanical Society, held at Thomaston, Warren, and Camden, Maine, August 12–16. Southwestward extensions of the ranges of *Euphrasia Randii* var. *Farlowii* and various other northeastern plants were noted.

Dr. M. A. Howe was unable to report upon any work in the field, but remarked briefly upon his recent studies of the marine algae of Peru and of fossil algae collected in the Panama Canal Zone by representatives of the U. S. Geological Survey.

Rev. L. H. Lighthipe remarked upon field observations at Belmar, Ventnor, and Longport, N. J., and at Long Beach and Ocean Beach on Long Island. *Lathyrus maritimus*, according to his observations, covering a considerable number of years, is increasing in abundance on the coast of New Jersey and is extending its range to the southward. The most southerly point

at which it was noticed during the past summer was Longport, a few miles south of Atlantic City.

The chairman, Professor E. S. Burgess, reported success in cultivating *Aster Amellus*, Virgil's favorite flower and the historic type of the genus *Aster*.

Adjournment followed.

MARSHALL A. HOWE
Secretary pro tem.

NEWS ITEMS

A. S. Hitchcock spent the summer months collecting and studying grasses in Arizona, California, Nevada, Utah and Colorado. Several weeks were spent in three of the National Forests of Nevada, the Toiyabe, Humboldt and Nevada. He was accompanied by his son Albert E. Hitchcock, who collected in Nevada a series of miscellaneous specimens.

Mrs. Agnes Chase, assistant in Systematic Agrostology, U. S. Department of Agriculture, is now in Porto Rico investigating the grass flora of that island.

Dr. J. N. Rose, who is making an exhaustive study of the Cactaceae of America, just returned from an extended trip through New Mexico and southwestern Texas, bringing back with him a collection of some 2,000 specimens of Cactaceae and other flowering plants.

On the evening of October 21 an audience of about one hundred people attended a meeting preliminary to the organization of a Botanical Society of Northeastern Ohio. The meeting was held in the New Kent State Normal School at Kent, Ohio, and was presided over by Professor L. S. Hopkins of that institution. The lecture of the evening was on the Botany of the Isle of Pines by Dr. O. E. Jennings of the Carnegie Museum, specimens being used for illustration. The second meeting, at which a committee consisting of Messrs. R. J. Webb, of Garrettsville, and A. D. Robinson and Walter Armstrong, of Ravenna, will report on constitution and nominate officers, will be held at Kent on November 21. At this meeting Supt. C. E. Bryant, of Coshocton, Ohio, will speak on "The Orchids of Ohio."

Dr. H. H. Whetzel, professor of phytopathology at Cornell University, is spending a year at the University of Heidelberg.

The preliminary announcement for the International Botanical Congress of 1915 has been issued. The meetings will be held at London from May 22–29, 1915, and additional information may be obtained from Dr. A. B. Rendle, British Museum, Cromwell Road, London, S. W.

Dr. R. M. Harker has issued recently a geographical and statistical study on "The Forest Regions of the Mississippi in relation to the Lumber Industry." It takes up many questions of interest to the phytogeographer. The original paper appeared in *The Southern Lumberman* on 23 August, 1913.

According to the *Evening Post* Mr. Charles L. Pack, of Lake wood, N. J., has given $6,000 to Princeton for the botanical-laboratory building fund.

At the University of West Virginia the following appointments have been made: Dr. A. Arkin, professor of bacteriology and pathology; Dr. L. J. Knight, plant physiologist in the experiment station, in coöperation with the University of Chicago University, and E. F. Woodcock, instructor in botany.

Mr. I. D. Odle has been appointed instructor in botany and bacteriology at the University of Florida. In the experiment station Mr. J. Matz has been appointed laboratory assistant in plant pathology, and Mr. O. F. Burger has been granted leave of absence for study at Harvard.

A. F. Blakeslee and C. D. Jarvis have issued, in pamphlet form, the keys contained in their "Trees in Winter" published early this year by Macmillan's. Keys to the genera and species of trees based on characters visible in winter are given in this pamphlet which will be of great use to teachers. It can only be obtained from the authors at Storrs, Conn. The price is thirty cents.

We learn from *Science* that Dr. Francis Gray Smart, of Tunbridge Wells, has left £10,000 to Gonville and Caius College, Cambridge, for two "Frank Smart Studentships" in natural

history or botany, and if this sum shall be more than sufficient to provide for these studentships the balance is to be used to promote the study of these subjects in that college.

Professor Josephine Tilden, of the department of botany, University of Minnesota, has returned from Australia and New Zealand, where she spent the past year in botanical research in the field and in collecting material in algology.

Mr. J. H. Muncie, assistant pathologist at the Ohio Agricultural Experiment Station at Wooster, Ohio, has been appointed assistant in plant pathology at the Michigan Agricultural College, beginning with November 17.

The Botanical Society of Washington gave a dinner and special program at the Powhatan Hotel on Tuesday evening, Dec. 2, 1913, in honor of the 70th birthday of the veteran botanist, Dr. Edward Lee Greene. The program consisted as follows: Personal experiences, Mr. F. V. Coville. Rocky Mountain Botany, Prof. Aven Nelson. Berkleyan Days, Mr. V. K. Chestnut. Botanical Writings, Prof. A. S. Hitchcock. Reminiscences, Mr. Ivan Tidestrom. The society will also present Dr. Greene with a book-plate in honor of the occasion.

Prof. Aven Nelson, of the University of Wyoming, is spending the month of December in Washington in the study of plants in the U. S. National Herbarium.

ERRATA, VOLUME 13

Page 111. Lines 11–14 should be changed to read: "The estimated ratios were as follows: (*a*) western highland (interior) −*.61;* (*b*) central lowland (interior) −*.47*, coast −*.48;* (*c*) eastern highland (interior) −*.42*."

Page 208. Fig. 3 is upside-down.

Page 215. Third line. "*Vaccinium stamineum*" should be changed to "*Gaylussacia frondosa*."

Page 250, 18th line, insert period after Poir.

Page 250, 17th line from bottom, for Buchhesiter, read Buchheister.

Page 250, 15th line from bottom, for *Heliposis*, read *Heliopsis*.

Page 251, 3d line from bottom, omit period after Presl.

Page 253, 8th line, for *rigidius*, read *rigidior*.*

Page 253, 13th line, for (L. Raf.), read (L.) Raf.

Page 253, 15th line from bottom, for Lam., read L.

Page 258, 3d line, for *acheanis*, read *achaenis*.

* Britton's Manual (both editions) has *rigida* in the key and *rigidus* in the text; Britton & Brown, Ill. Fl. (2d ed.) has it *rigidius*, but they are *all* wrong! Linnaeus's original was *Sium rigidius*, *rigidius* being neuter comparative, of which the feminine comparative is *rigidior*. Gray's New Manual has it right.

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The Torrey Botanical Club

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* Died September 14, 1913.
† Died February 1, 1913.